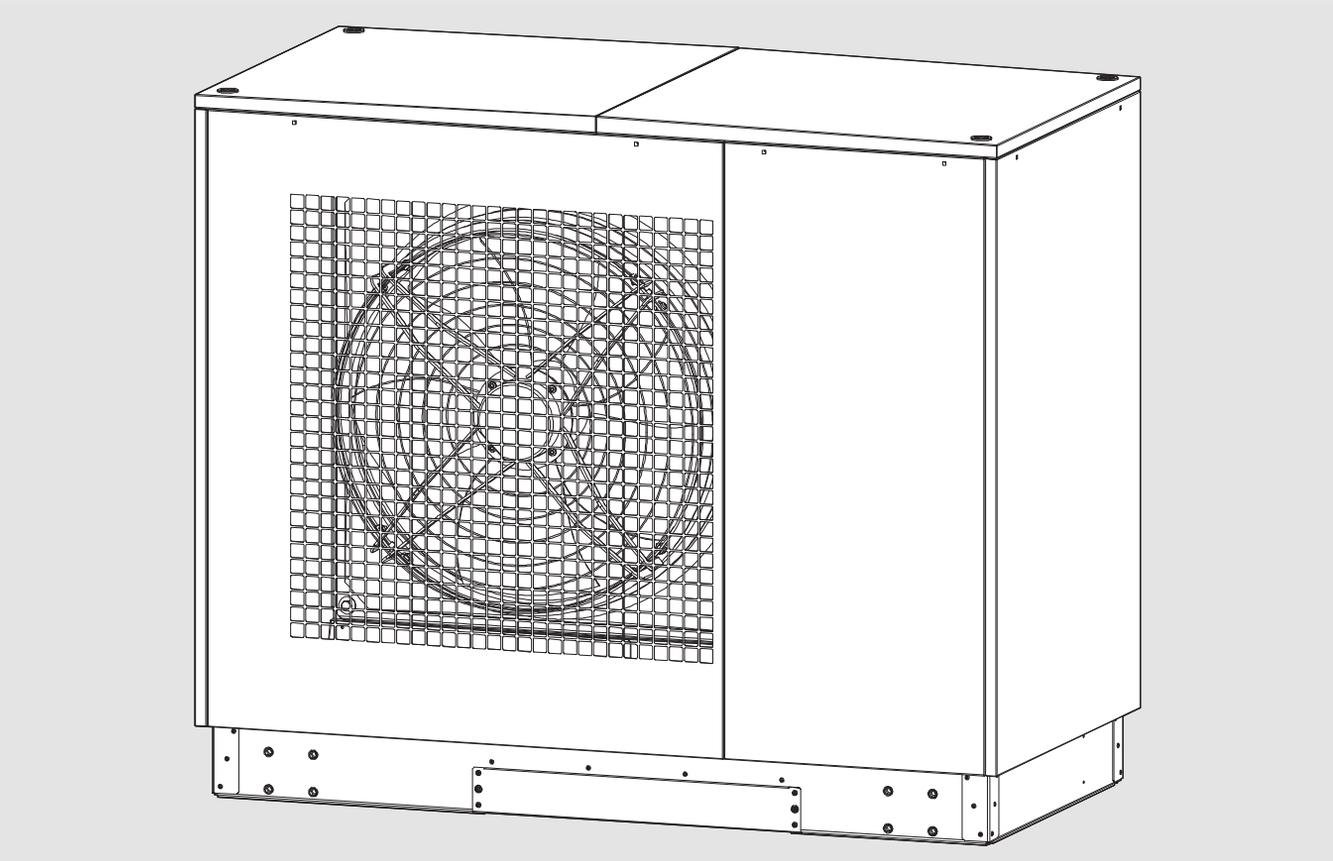
BOSCH

Installation and operating instructions

Air to Water Heat Pump

CS5001AW 22



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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe to life-threatening personal injury will occur.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in serious personal injury or danger to life.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate personal injury.

NOTICE

ATTENTION indicates that material damage may occur.

Important information

The info symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document
•	a list entry
–	a list entry (second level)

Table 1

1.2 General safety instructions

This manual describes the correct procedures for installing, using and maintaining the unit. To save time during operation and to prevent injury and damage to property, the manual must be read carefully and kept for future reference.

Particular attention must be paid to warnings, prohibitions and hazard symbols, which indicate important measures or information, as well as procedures that may impair the functionality of the unit or cause damage to property or personal injury, and therefore must not be carried out.

Observe the applicable safety regulations during all activities.

Wear the following protective equipment when carrying out the work:

- Protective gloves
- Safety goggles
- Safety helmet
- Ear protection
- Safety shoes
- Knee pads

All work must be carried out by qualified heating engineers and/or electricians who have been trained in potential general and electrical risks, as well as in the dangers that could result when working on units under pressure. In accordance with the applicable regulations, only competent and authorised specialists may carry out work on the unit.

1.2.1 Specific danger and residual risks

- Residual energy
  - Hot surfaces on unit parts
  - Electrical voltage in the switch box despite the main switch being switched off
  - Refrigerant circuit is under pressure
- Substances harmful to health
  - Follow the legal regulations and guidelines when handling refrigerants.
  - Handling of refrigerant is restricted only to specialist personnel.
  - Use personal protective equipment comprising protective gloves, safety shoes, safety goggles and long, closed clothing.
  - Refrigerants and system components that are no longer in use must be disposed of properly by the user of the heat pump.
- Hydraulics
- Sound pressure
- Heat
- Risk of explosion and fire
- Risk of scalding
  - High temperatures may lead to a risk of scalding; if the system requires hot water, a mixing unit must be installed.
- Risk of injury due to modification of the unit
- Risk of injury due to wear or damage to the unit
- Risk of injury due to tripping hazards and spilled operating materials
  - Avoid tripping hazards caused by cables, pipes and hoses.
  - Absorb spilled operating fluids with suitable binder and dispose of in accordance with the hazard class.

1.2.2 Work on electrical power connections and components

In all life phases, work on electrical power connections or components must be carried out exclusively by electricians. Comply with national and regional regulations on accident prevention and for carrying out electrical installations.

Before commencing any work on electrical power connections or components, observe the five electrical safety rules:

- Switch off
- Secure against switching back on
- Make sure the power supply is disconnected at all terminals
- Earth and short-circuit
- Cover or block off nearby live parts

After switching off the power, wait five minutes until all components are de-energised.

1.2.3 Hazards due to misuse

This heat pump can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, if they have been given supervision or instruction concerning use of heat pump in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and end customer maintenance must not be carried out by children without supervision.

Use the heat pump only in accordance with its intended purpose. Examples of misuse include:

- Operating the heat pump without a protection unit (façade cladding, cover grilles)
- Carrying out work without sufficient qualifications/expertise
- Structural modifications to the heat pump not intended by the manufacturer

1.2.4 Intended use

This unit is approved only for the purpose intended by the manufacturer → Chapter 3.2, page 5. Any other use or any use beyond this is not considered intended use.
Do not make any changes or modifications to the unit.

⚠ Installation, commissioning and servicing

The product must be installed, commissioned and maintained only by a qualified installer. No liability is accepted for damage caused by modifications not described in these instructions.

- ▶ Use only original spare parts.
- ▶ Do not make any changes to the product or other parts of the heating system that are not described in these instructions.

⚠ Handover to the user

Instruct the user on the operation and operating conditions of the heating system during the handover.

- ▶ Explain the operation of the system – in doing so, with particular emphasis on all safety-related actions.
- ▶ Point out that conversions or repairs may be carried out only by qualified installers.
- ▶ Also point out the need for inspection and maintenance to guarantee a safe and environmentally friendly operation.
- ▶ Hand over the installation instructions.

2 Regulations

Follow the directives and regulations given below:

- Local provisions and regulations of the electricity supplier as well as the associated special rules

- ▶ Observe updated regulations or supplements. These regulations also apply at the time of installation.
- ▶ Observe all standards and guidelines applicable to the installation and operation of the system in your country and region.

Standalone heat pump systems do not meet the requirements for critical infrastructure set out in EU Directive 2022/2557.

- **EN 806** (Technical rules for potable water installations)
- **EN 1717** (Protection against pollution of potable water installations)
- **EN 60335-1** (Household and similar electrical appliances)
- **EN 50160** (Voltage characteristics of electricity supplied by public electricity networks)
- **EN 12828** (Heating systems in buildings - Design and installation of water-based heating systems)
- **EN 378** (Refrigerating systems and heat pumps – Safety and environmental requirements)
- **EN 60335-2-40** (Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers)

3 Product Information

3.1 Scope of delivery

Heat pump WLW 286.2

The following are included in the scope of delivery of the heat pump:

- Installation and operating instructions
- Condensate drain pipe:
  Located behind the front cladding at the fan
- Heat pump manager:
  Located in a separate box on the heat pump

The heat pump is provided with the components listed below.
Refrigerant R290 (propane) is used.

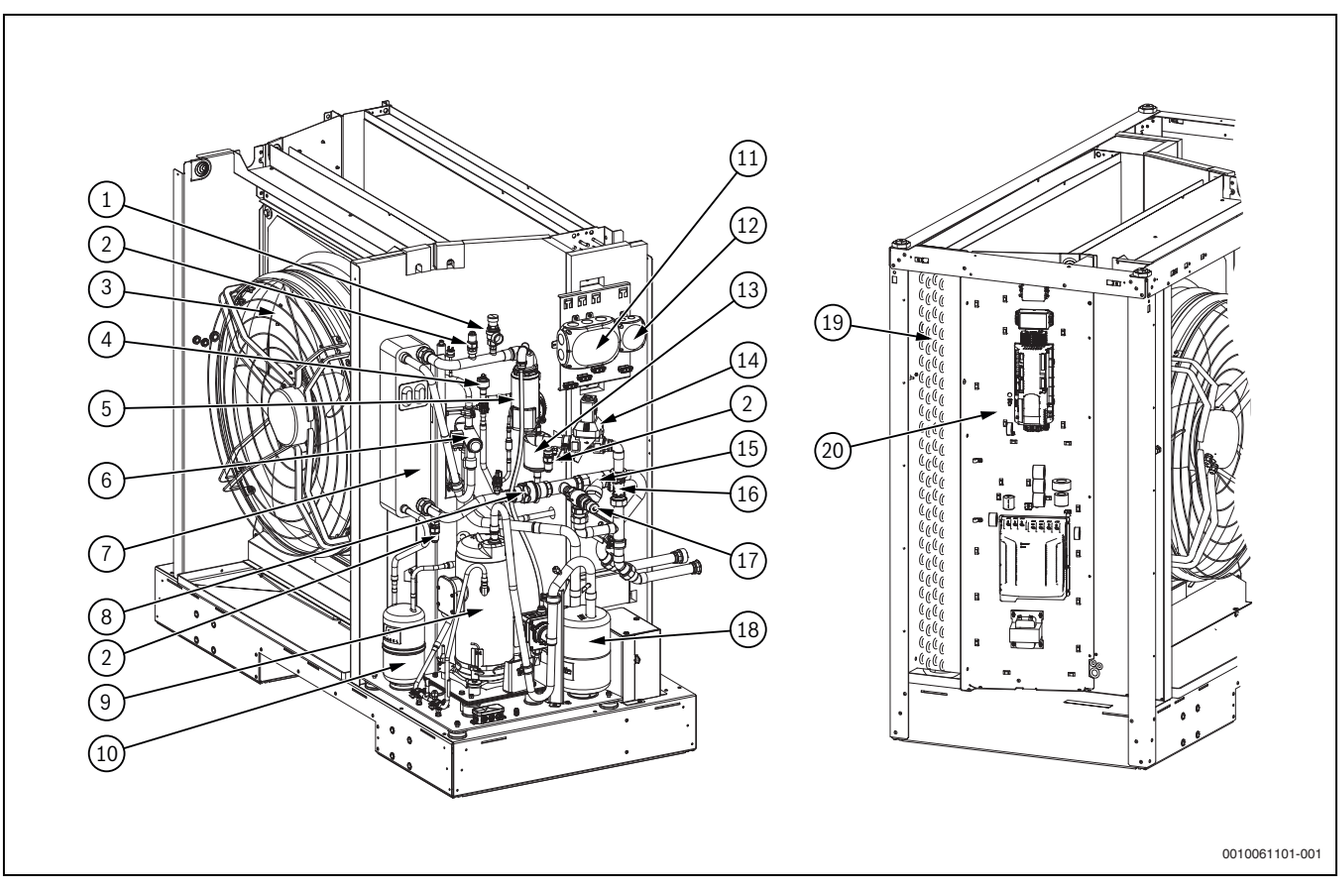

Fig. 1 scope of delivery of heat pump WLW 286.2

[1] Water pressure relief valve
[2] Anti-freeze valve
[3] Fan
[4] Expansion valve
[5] Air separator
[6] 4-way diverter valve
[7] Condenser
[8] Non return valve
[9] Compressor
[10] Collector
[11] Terminal box, external
[12] Terminal box, M16
[13] Dryer filter
[14] Solenoid valve
[15] Dirt trap
[16] Flow sensor
[17] Overcurrent valve
[18] Liquid separator
[19] Evaporator
[20] Control device

3.1.1 Heat pump manager

The heat pump manager is an electronic regulating and control unit. It controls and monitors the entire heating system based on the outdoor temperature, DHW heating and operating limits. The outdoor temperature sensor, which must be installed on site, is included with the heat pump manager and the fixing material is enclosed. The operation and handling of the heat pump manager are described in the operating instructions supplied with it.

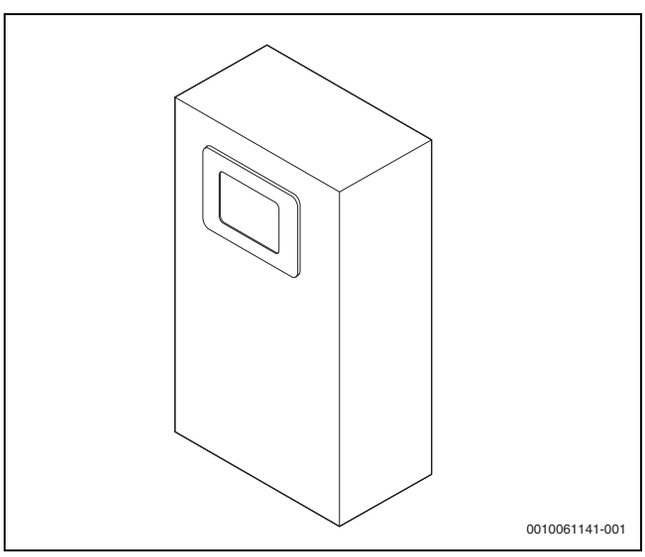

Fig. 2 Heat pump manager

▶ Use the heat pump manager to operate HPC 301 the heat pump.

The scope of delivery of the heat pump manager for wall-mounted installation includes:

- Heat pump manager with enclosure
- 3 wall plugs (6 mm) with screws for wall mounting
- Outside temperature sensor R1
- Demand sensor R2.2
- Touch screen
- Installation instructions for the heat pump manager
- Operating instructions for users and the specialist

Building services management system

The heat pump manager can be connected to a Modbus RTU building management system via the standard interface plug-in card. By replacing this interface plug-in card with a KNX interface plug-in card, available as an accessory, these networks can also be accessed.

For the exact connection and parametrisation of the interfaces, please refer to the supplementary installation instructions for the interface cards.

The following protocols are available:

- Modbus RTU
- KNX

The Compress CS5001AW 22 can be integrated into the Bosch control system via Modbus RTU. Via the Bosch Control 8000 control system, the heat pump can be integrated into multi-source systems and also activated online via the professional customer portal MEC-Remote. Information on integration into the Bosch Control 8000 can be found in the controller-specific planning document (→ PD Bosch Control 8000).

3.1.2 Terminal box, external

The external terminal box contains the mains connection terminals (load/control voltage) and the connection terminals for the communication line.

▶ Connection work must be carried out only on the external terminal box and the M16 terminal box.

3.1.3 Terminal box, M16

The M16 terminal box contains the mains connection terminals (load / control voltage) for the M16 primary pump.

3.2 Product description

The air-to-water heat pump is intended exclusively for heating and cooling heating water. It can be used in existing or newly installed heating systems.

The heat pump is intended for use in residential, commercial and commercial areas, as well as in small businesses. The heat pump is not intended for industrial areas.

The heat pump is intended exclusively for outdoor installation → Chapter 4.1, page 7.

The primary pump(s) must be controlled via the heat pump manager or the M16 terminal box of the → Chapter 4.12.3, page 31. If pump functions relevant to operation or safety are not supported, e.g. due to the integration of the heat pump into a building management system, this will result in the loss of the warranty and may lead to damage to the heat pump.

The primary pump(s) and the heat pump controller, including the refrigerant gas sensor, must always be operational.

The specifications in the technical documentation, in particular the limit values for the minimum and maximum heating/cooling water flow rate, must be observed.

The heat pump is suitable for mono-energy and bivalent operation down to an outdoor air temperature of -22 °C. During continuous operation, the heating water return temperature must be maintained at over 18 °C to ensure proper defrosting of the evaporator. The maximum water outlet temperature must not exceed 70 °C and must be protected on the system side in such a way that, if the temperature is exceeded, all additional heat sources are safely switched off.

The heat pump is not designed to meet the increased heat energy demand during building drying; therefore, the additional heat energy demand must be met using special on-site units. For building drying in autumn or winter, we recommend installing a suitable second heat generator (e.g. a booster heater, available as an accessory).

In cooling mode, the heat pump is suitable for air temperatures ranging from 10 °C to 45 °C. It can be used for static (above dew point) and dynamic (below dew point) cooling. The minimum cooling water outlet temperature is 7 °C.

NOTICE

Property damage caused by using an external 4-way valve

Using an external 4-way valve to reverse the flow direction at the plate heat exchanger may cause damage to the unit.

▶ Do not use a 4-way valve on the heating water side.

3.3 Mode of operation CS5001AW 22

Heating with air as the heat source

Ambient air is drawn in by the fan and passed over the evaporator (heat exchanger). The evaporator cools the air, i.e. it extracts heat from it. The heat extracted is transferred in the evaporator to a working medium (refrigerant).

With the aid of the electrically driven compressor, the absorbed heat is raised to a higher temperature level by increasing the pressure and transferred to the heating water via the condenser (heat exchanger).

In this process, electrical energy is used to raise the ambient heat to a higher temperature level. As the energy extracted from the air is transferred to the heating water, this unit is referred to as an air to water heat pump.

The air to water heat pump consists of the main components evaporator [19], fan [3] and expansion valve [4], as well as the compressor [9], the condenser [7] and the electrical control system→ Fig. 1 page 4.

At low ambient temperatures, humidity in the air condenses as frost on the evaporator, impairing heat transfer. In doing so, uneven build-up does not constitute a fault. The heat pump automatically defrosts the evaporator as required. Depending on the weather conditions, this may cause water vapour to form at the air outlet.

Cooling with air as the heat source

In "Cooling" mode, the functions of the evaporator and condenser are reversed. The heating water transfers heat to the refrigerant- via the condenser-, which is now functioning as an evaporator. The compressor raises the refrigerant to a higher temperature. The heat is released into the ambient air via the condenser (which acts as the evaporator in heating mode).

Energy-efficient operation of the heat pump

The prerequisite for energy-efficient operation of the heat pump is the correct sizing of the heat sources and the heat recovery system.

The efficiency of the heat pump depends largely on its operating parameters. Simple adjustments to user behaviour and the settings on the unit can have a positive impact on efficiency. Examples include:

- Reducing the operating temperature. (Reducing the flow temperature by 1 °C reduces the demand for electrical energy by approx. 2.5 %)
- Matching the temperature in the DHW cylinder
- Demand-controlled DHW circulation pump (e.g. pulse control)
- Regular maintenance
- Keep the heat pump free of dirt, leaves and snow build-up
- Compliance with the required water quality→ Chapter 4.9.3, page 28

3.4 Product overview

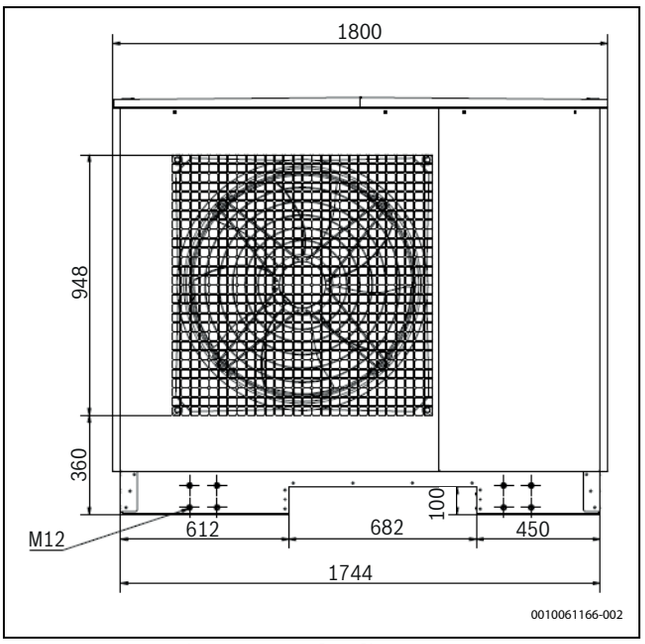

Fig. 3 Front view (dimensions in [mm])

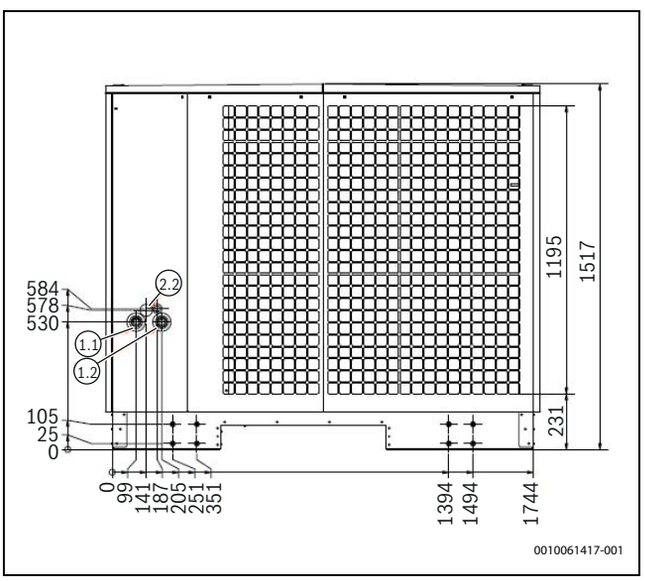

Fig. 4 Rear view (dimensions in [mm])

1.1 Heating flow R1 ¼" thread seal
1.2 Heating return R1 ¼" thread seal
2.2 Electric cable outlet

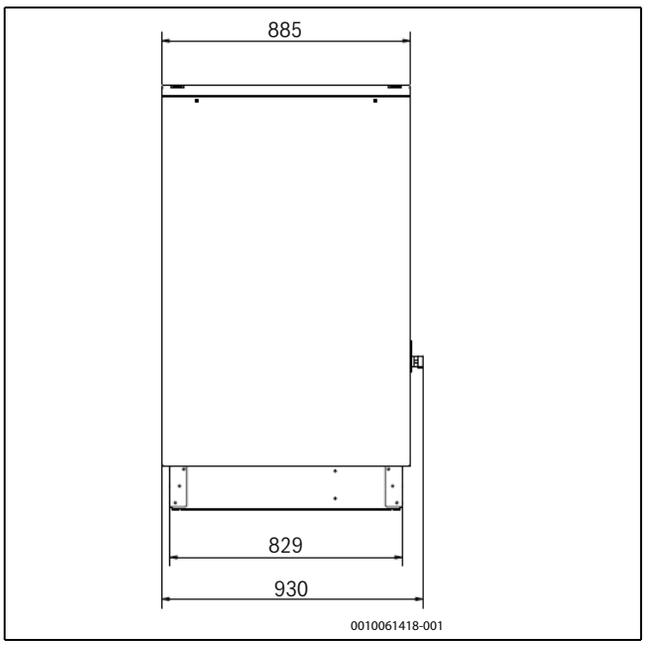

Fig. 5 Side view (dimensions in [mm])

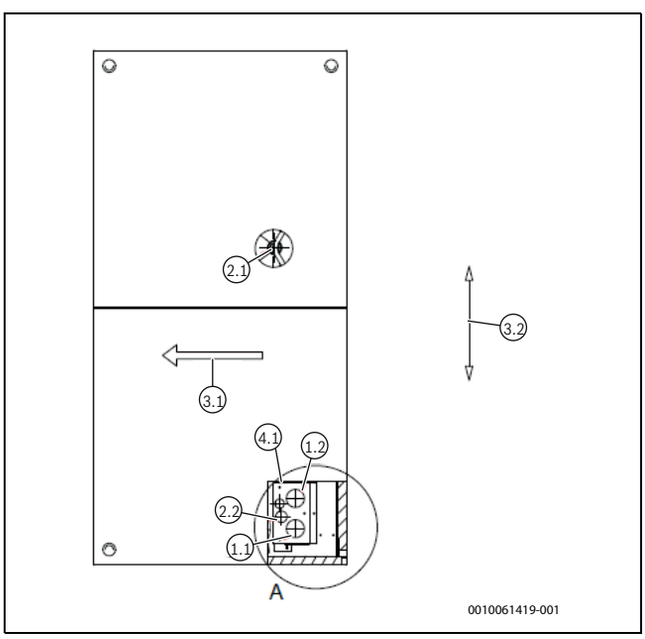

Fig. 6 Top view (dimensions in [mm])

1.1 Heating flow R1 ¼" thread seal
1.2 Heating return R1 ¼" thread seal
2.1 Condensate hose
2.2 Electric cable outlet
3.1 Air direction
3.2 Main wind direction
4.1 Installation shaft for connection from underneath
A Detail A → Graphic 8, page 7

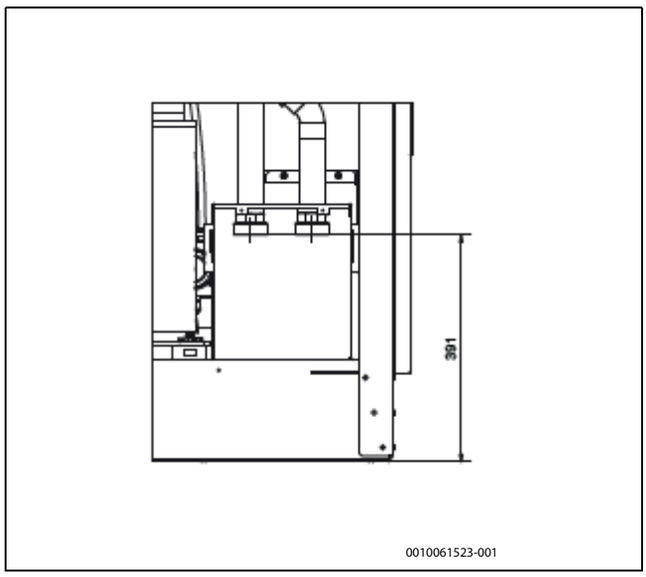

Fig. 7 Side view - connection from underneath (dimensions in [mm])

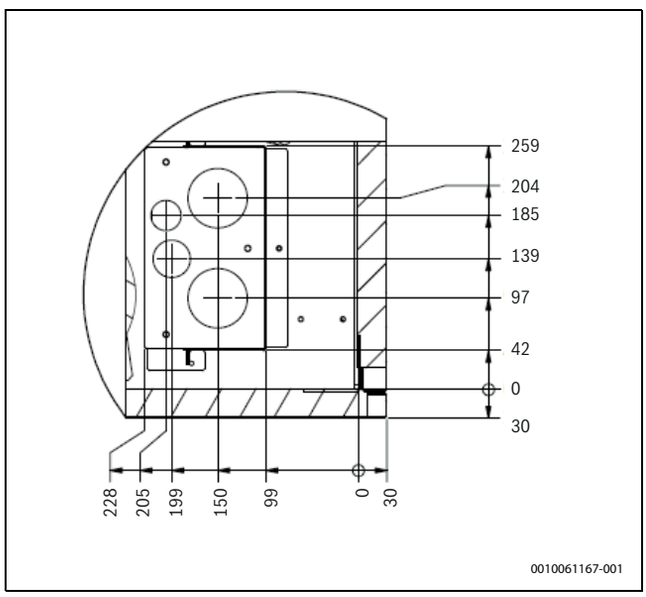

Fig. 8 Detail A (dimensions in [mm])

4 Installation

4.1 Installation

The heat pump is designed for areas accessible to the general public, as well as for areas not accessible to the general public.

The following guidelines must be strictly adhered to when installing and operating the system.

Responsibility for the installation of the heat pump lies with the specialist installation company. Observe country-specific building regulations.

Once the heat pump has been commissioned by a qualified installer, responsibility for the correct operation of this heat pump lies with the user.

Protect the heat pump, in particular the refrigeration circuit, from damage (e.g. drilling, burning, etc.) during installation and other construction work.

DANGER

Risk of death from fire and explosion

If a leak of the refrigerant propane occurs in the event of a fault, a flammable atmosphere may form.

- ▶ Ignition sources and fire loads are prohibited within the protected area.
- ▶ Keep the enclosure closed.

DANGER

Risk of death from fire and explosion

If a leak of the refrigerant propane occurs in the event of a fault, a flammable atmosphere may form, particularly in recesses, shafts or areas that do not allow the air to flow freely or air exchange.

- ▶ Installation in recesses, shafts or areas that do not allow for free air flow or air change-over is not permitted.
- ▶ Install the heat pump in such a way that, in the event of a leak, no refrigerant can enter the building.
- ▶ Seal empty ducts, openings, etc., leading into buildings, shafts, etc., airtight.

The heat pump is not intended for use above 2000 m above sea level.

Requirements for heat pumps installed outdoors

Always take into account the conditions at the installation site, such as local building regulations, structural loads on the building, wind loads, lightning protection, for example!

Observe the following requirements when installing the heat pump outdoors:

Set up location and alignment

- Always install the heat pump on a suitable, load-bearing foundation.
- Provided the protection zones described in chapter 4.2 are observed, the heat pump can be installed either near to the ground or raised off the ground.
  If installed on a raised base, the base must be at least 400 mm high and, due to the need for under ventilation, must not be solid across its entire surface. This can be achieved using a strip foundation or the mounting base MS 22, available as an accessory.
- Install the heat pump so that the air discharge direction of the fan is perpendicular to the prevailing wind direction to ensure proper defrosting of the evaporator under high wind loads.
- Roof installation is permitted up to the following heights, depending on the wind load zone of the installation site:
  Wind load zone 1: max. roof height = 25 m
  Wind load zone 2: max. roof height = 18 m
  Wind load zone 3: max. roof height = 8 m
- If the maximum permissible roof height for the applicable wind load zone is exceeded, on-site wind protection or securing measures are required for installation. Observe the specified protection zone
- For roof installation in a wind-exposed area, ensure that wind does not affect the fan area. Strong wind can disrupt the airflow through the air heat exchanger.
- The intake of the and exhaust areas of the fan must not be reduced.
- Installation in garages is not allowed.
- Do not install the heat pump in recesses or courtyards. If the heat pump draws in cooled air close to the ground (air short-circuit), this may result in property damage or reduced efficiency.

Installation close to a wall

- Air flow in the inflow and outlet areas can lead to increased accumulation of dirt if installed close to a wall. For energy efficiency reasons, ensure that the heat pump has a clear outlet.
- If installing close to a wall, take into account the factors affecting building physics. There should be no windows or doors within the outlet path of the fan.
- The colder outside air should be discharged in such a way that it does not increase heat loss in rooms heated adjacently or lead to moisture damage caused by condensation.

Impact protection

- To protect the heat pump from mechanical damage, install units such as impact protection against flying balls or fences to prevent vandalism.
- Provide heat pumps located along traffic routes with impact protection. Design this impact protection in such a way that a collision with a vehicle travelling at the applicable speed limit does not result in damage to the refrigeration circuit.

Sound insulation

- When installing on a foundation in direct contact with the building, ensure vibration decoupling to prevent structure-borne noise from being transmitted into the building.

Lightning protection

- Check whether lightning protection is required and, if necessary, install it.

Service and protection zone

- Maintain a service and protection zone around the heat pump in accordance with the installation type.
- To carry out maintenance work, keep a service area (S) with the clearances shown freely accessible.

Covers

- The covers and casing panels of the heat pump must be sealed to ensure optimum sound insulation and to protect the interior of the unit from small animals.
- After using lifting eyes (accessories) when transporting by crane, these must be removed and the openings in the enclosure sealed with the rubber grommets supplied.

Ambient air

- When using heat pumps near the sea, the high salt content in the air can lead to increased corrosion. The use of heat pumps is safe at a distance of 12 km or more from the sea with a maximum salt content of 3.5 %. For shorter distances, see → "Installation in coastal areas", page 9.
- Do not expose the unit to corrosive or persistently dusty air (e.g. near stables). Air containing dust and/or ammonia can cause permanent damage to the unit.

DANGER

Danger due to an enclosure not closed!

Small animals such as rodents entering the unit can cause damage.

- ▶ The cover plate of the water connection box in the heat pump must be closed when connecting from the rear (standard configuration).
- ▶ When connecting the heat pump vertically, all plates of the installation shaft must be mounted once the installation work is complete.
- ▶ When connecting from below, the connections on the rear must be covered.
- ▶ All cladding panels of the heat pump must be mounted.

Installation in coastal areas

If the unit is installed near the sea, the high salt concentration may lead to increased corrosion. Maintenance intervals may need to be adjusted to suit local conditions. Responsibility for the installation of the heat pump lies with the specialist installation company.

Local conditions such as building regulations, structural loads on the building, wind loads, etc. must be taken into account.

If the outdoor unit is installed in a coastal area, direct sea winds must be avoided.

Case 1:

If the outdoor unit is installed in a coastal area, direct sea breezes should be avoided.

- ▶ Install the outdoor unit facing away from the direction of the sea breeze.

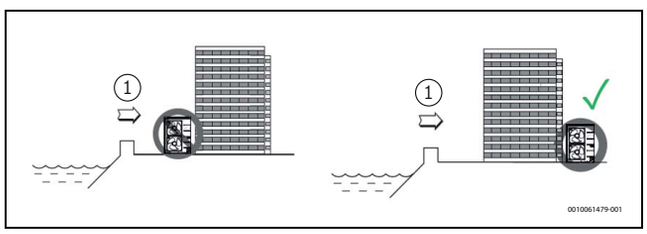

Fig. 9 Installation facing away from the sea breeze

[1] Sea breeze

Case 2

- ▶ If the outdoor unit is installed facing the sea breeze, erect a windbreak to block the sea breeze.
  - – The windbreak must be sturdy enough to block the sea breeze; for example, it should be made of concrete
  - – The height and width of the windbreak must be at least 150 % of the outdoor unit
  - – Maintain a distance of at least 700 mm from the outdoor unit to ensure sufficient airflow

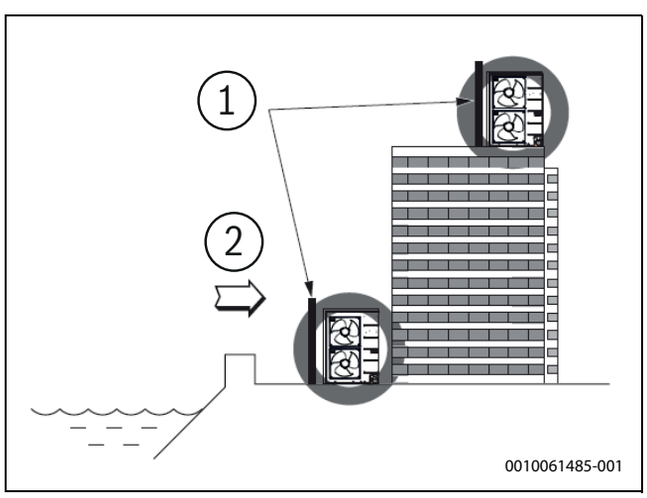

Fig. 10 Installation facing the sea breeze with a windbreak

[1] Windbreak
[2] Sea breeze

- ▶ Clean dust and salt deposits from the heat exchanger and fan using running water at regular intervals (at least once a year).

Heat pumps can be used safely at a distance of 12 km or more from the sea with a maximum salt content of 3.5 %.

If the heat pump is installed on the rear side of a building facing away from the sea, the required minimum distance is halved. For water bodies with low salt content, the following formula may be used:

$$\text{Minimum distance} = \frac{12\ \text{km} \times \text{salt content in \%}}{3.5\ \%}$$

Salt content

The actual salt content depends on the installation site and must be determined on site.:

Average salt content of the North Sea:	3.5 %
Average salt content of the Baltic Sea:	1.8–0.3% (the salt content decreases from west to east)

Table 2 Average salt content in the North Sea and Baltic Sea

The minimum distance would therefore be 5.14 km, for example, for an installation on the Baltic Sea with a salt content of 1.5 %, which is reduced to 2.5 km if the heat pump is located on the rear of the building facing away from the sea.

4.2 Protection zone

Depending on the installation type, a protection zone must be maintained around the heat pump (see figures).

Prohibited within the protection zone:

- Ignition sources such as sockets, light switches, lamps, electrical switches or other permanent ignition sources
- Windows and doors
- Ventilation openings, light wells, openings to the sewer system and the like

Further requirements for the protection zone:

- Smoking is prohibited within the protection zone of the heat pump.
- Fire loads are prohibited within the protection zone.
- If other units are installed within the protection zone, these components must not constitute a source of ignition or a fire load.
- A second heat pump may only be installed within the protection zone of another heat pump if, in accordance with the installation and operating instructions, it does not constitute a source of ignition. The protection zone is determined by the combination of the individual protection zones of the units. It is essential to observe the required service areas.
- Open drains leading to a lower level are permitted provided there are no drains into the channel system within the protection zone.
- Ensure that any building penetrations within the protection zone are airtight.
- The protection zone must not extend onto neighbouring properties or public thoroughfares.
- Position the unit in such a manner that, in the event of a leak, no refrigerant enters neighbouring buildings.
- No structural changes may be made within the protection zone that would compromise it.
- The protection zone must not extend to car or HGV parking spaces.
- Units and vehicles may only be placed within the protection zone if the manufacturer's documentation confirms that they do not constitute a source of ignition and the service area around the heat pump is maintained.

- ▶ Keep the service area **(S)** freely accessible for carrying out maintenance work.

4.2.1 Protection zone for installation close to a wall

Raised installation

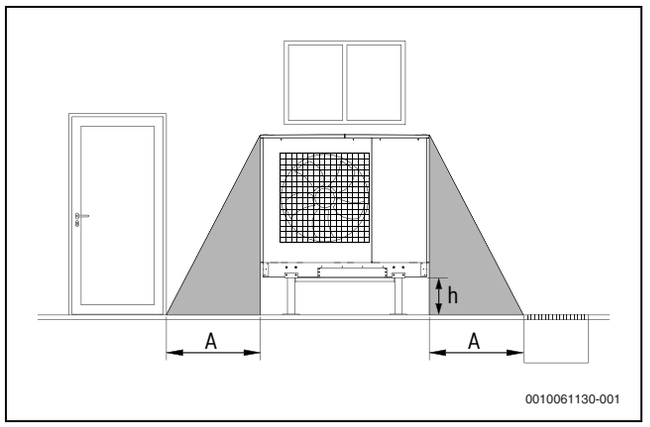

Fig. 11 Protection zone for installation close to a wall

A, B, C Safety clearances depending on the respective installation situation
S Service clearance for work on the refrigeration circuit or the inverter
h Installation height

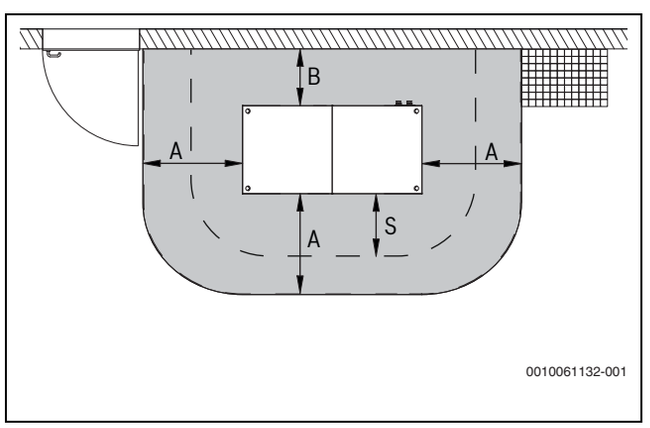

Fig. 12 Protection zone for installation close to a wall with raised installation

A	1.5
B	0.8
S	1.0
h	0.4

Table 3 Protection zone for installation close to a wall with raised installation (dimensions in [m])

When installed 40 cm higher, a protection zone of 1.5 m must be maintained all round the heat pump. The minimum wall clearance on the intake side is 80 cm. No additional walls must obstruct air distribution.

Floor-standing installation

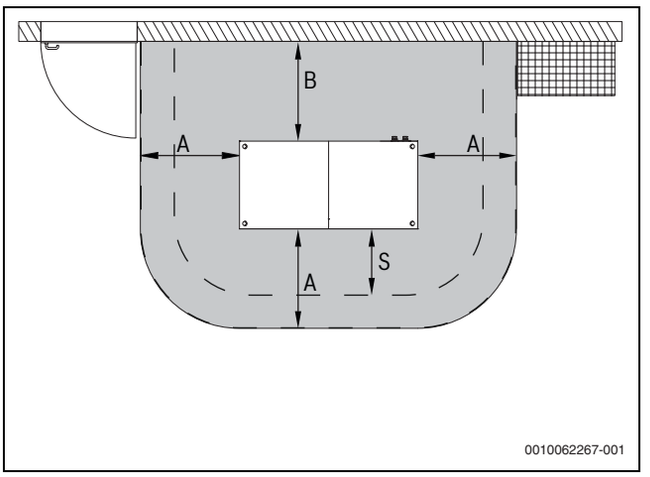

Fig. 13 Protection zone for installation close to a wall with floor-standing installation

A	1.5
B	1.5
S	1.0

Table 4 Protection zone for installation close to a wall with floor-standing installation (dimensions in [m])

4.2.2 Protection zone for corner installation

Raised installation, right side

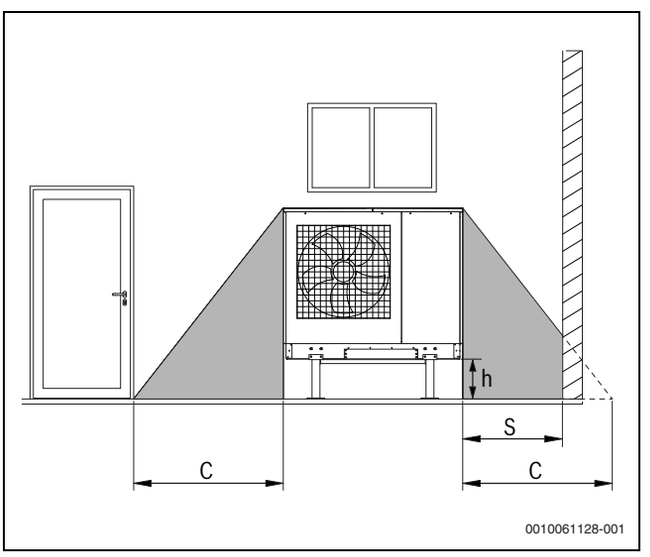

Fig. 14 Protection zone for corner installation, right side, with raised installation

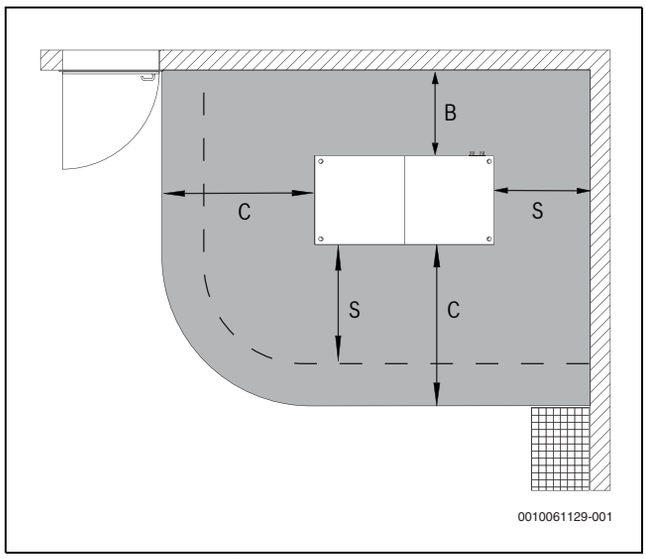

Fig. 15 Protection zone for corner installation, right side, with raised installation

B	0.8
C	2.0
S	1.0
h	0.4

Table 5 Protection zone for corner installation (dimensions in [m])

The installation variant shown for a right-hand corner requires a protection zone **(C)** of 2.0 m. Due to the positioning of the propane sensor, the clearances for this variant cannot be applied to a left-hand corner.

Raised installation, left side

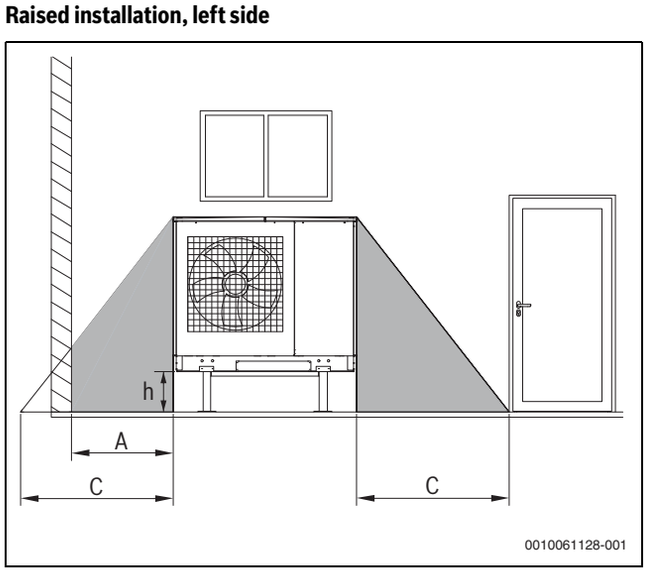

Fig. 16 Protection zone for corner installation, left side, with raised installation

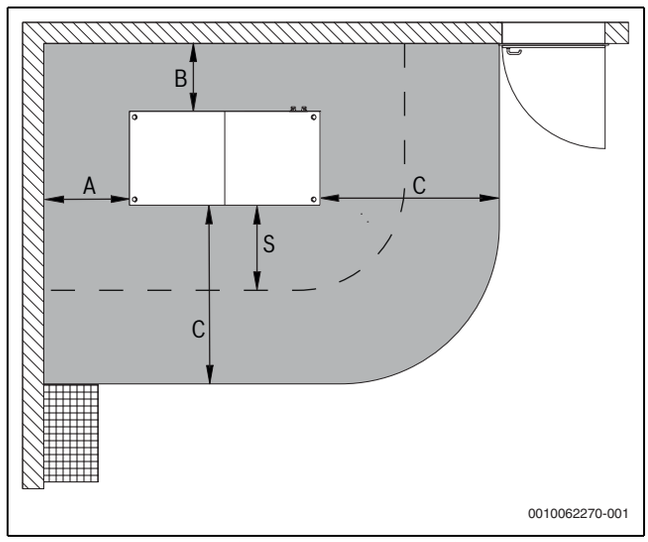

Fig. 17 Protection zone for corner installation, left side, with raised installation

A	1.0
B	0.8
C	2.1
S	1.0
h	0.4

Table 6 Protection zone for corner installation, left side, with raised installation (dimensions in [m])

4.2.3 Protection zone for outdoor installation

Raised installation

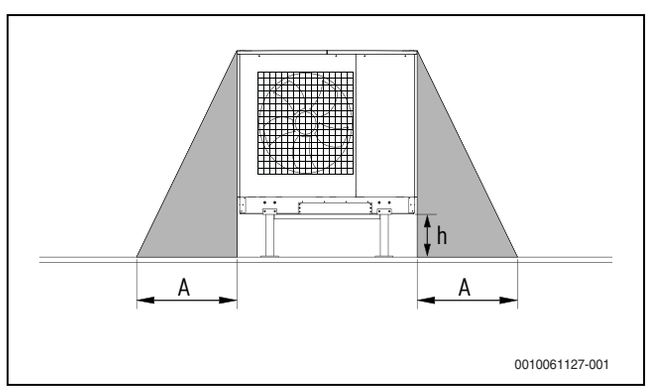

Fig. 18 Protection zone for outdoor installation with raised installation

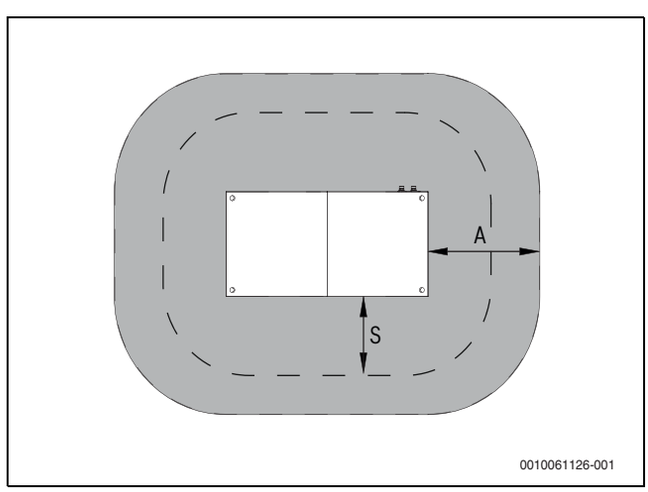

Fig. 19 Protection zone for outdoor installation with raised installation

A	1.5
S	1.0
h	0.4

Table 7 Protection zone for outdoor installation with raised installation (dimensions in [m])

Floor-standing installation

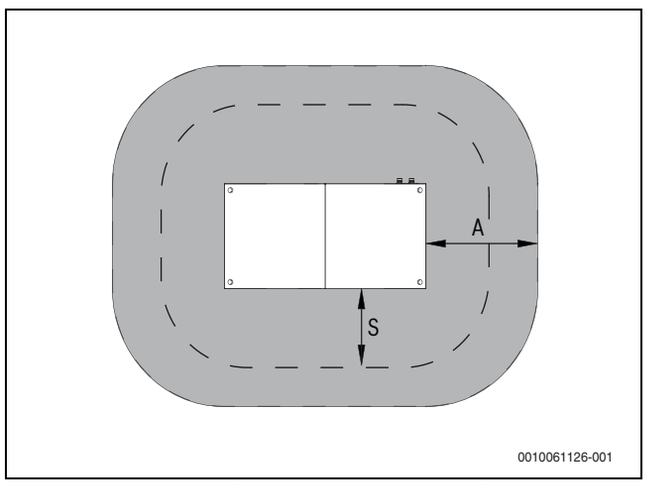

Fig. 20 Protection zone for outdoor installation with floor-standing installation

A	1.5
S	1.0

Table 8 Protection zone for outdoor installation with floor-standing installation (dimensions in [m])

4.3 Condensate pipe for heat pumps using flammable refrigerants

A frost-free condensate drain must be ensured. To ensure proper drainage, the heat pump must be installed precisely horizontal.

The frost line may vary depending on the region. Observe the regulations of the respective countries.

Drainage of the condensate into the building is not permitted.

Variant 1: Condensate drain into a gravel bed

The condensate produced during operation is drained vertically into a foundation with a gravel bed.

Requirements:

- Daily drainage capacity of at least 1.5 litres per kW of heat pump output
- Condensate tube diameter of at least 50 mm
- Condensate tube installed vertically to prevent ice build-up in winter

If the condensate tube is at risk of freezing, ensure that the appropriate condensate drain heater from the list of accessories of the unit is provided.

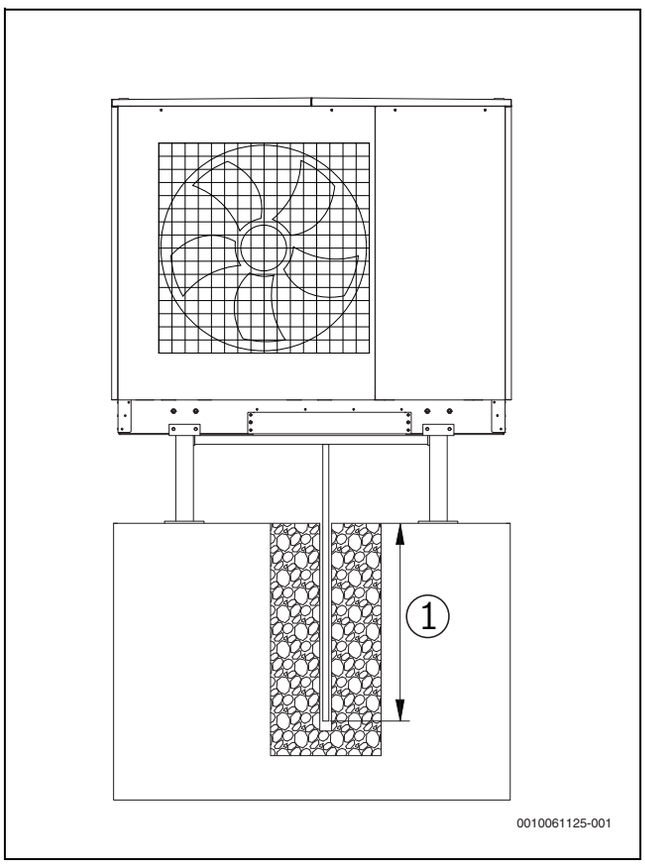

Fig. 21 Condensate drain in a gravel bed

1 Frost line

Variant 2: Discharge into a sewer, storm drain or drainage channel
The condensate is discharged into a sewer, storm drain or drainage channel via a condensate pipe laid in the ground.

Requirements:
- Siphon in the condensate tube below the frost line. The water level in the siphon prevents refrigerant from entering the channel in the event of a leak.
- Siphon with a minimum water seal level of 300 mm
- Lifting systems are not permitted.

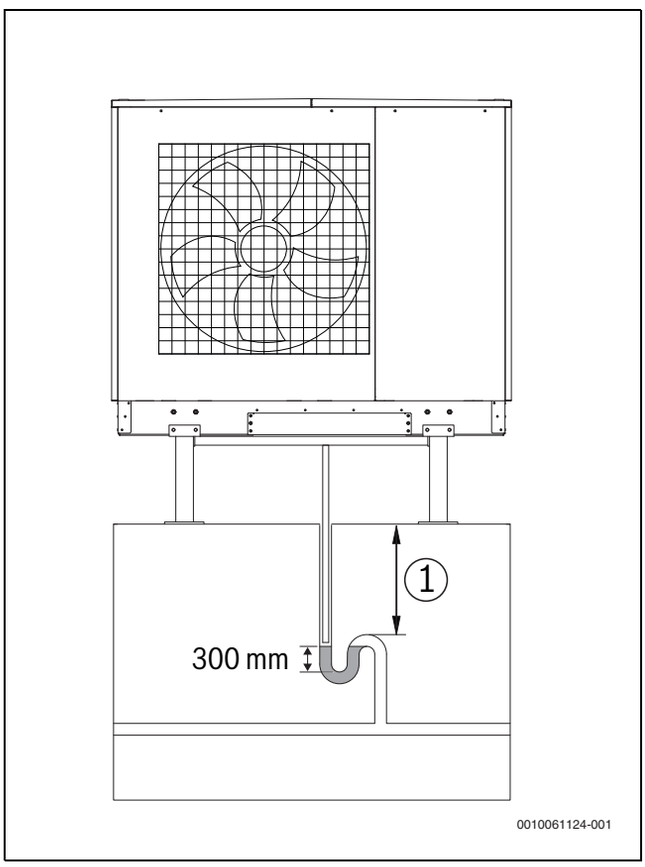

Fig. 22 Discharge into a sewer, storm drain or drainage channel

1 Frost line

Variant 3: Open drainage
Open drainage is only recommended in climates with short periods of frost. In colder climates, the condensate tube in areas at risk of frost must be fitted with appropriately sized and controlled electric trace heating on the insulated condensate tube .

4.4 Heat pump cascades for raised installation

Prohibited within the protection zone:
- Ignition sources such as sockets, light switches, lamps, electrical switches or other permanent ignition sources
- Windows and doors
- Ventilation openings, light wells, openings to the sewer system and the like

Further requirements for the protection zone:
- Fire loads in the protection zone must be avoided.
- Units and vehicles may only be placed within the protection zone if the manufacturer's documentation confirms that they do not constitute a source of ignition and the maintenance clearances around the heat pump is maintained.
- Any openings in the building within the protection zone must be made airtight so that, in the event of a leak, no refrigerant can enter the building.
- The protection zone must not extend onto neighbouring properties or public thoroughfares.

The heat pump Compress CS5001AW 22 itself does not constitute a source of ignition.

Variant 1: 2 heat pumps side by side

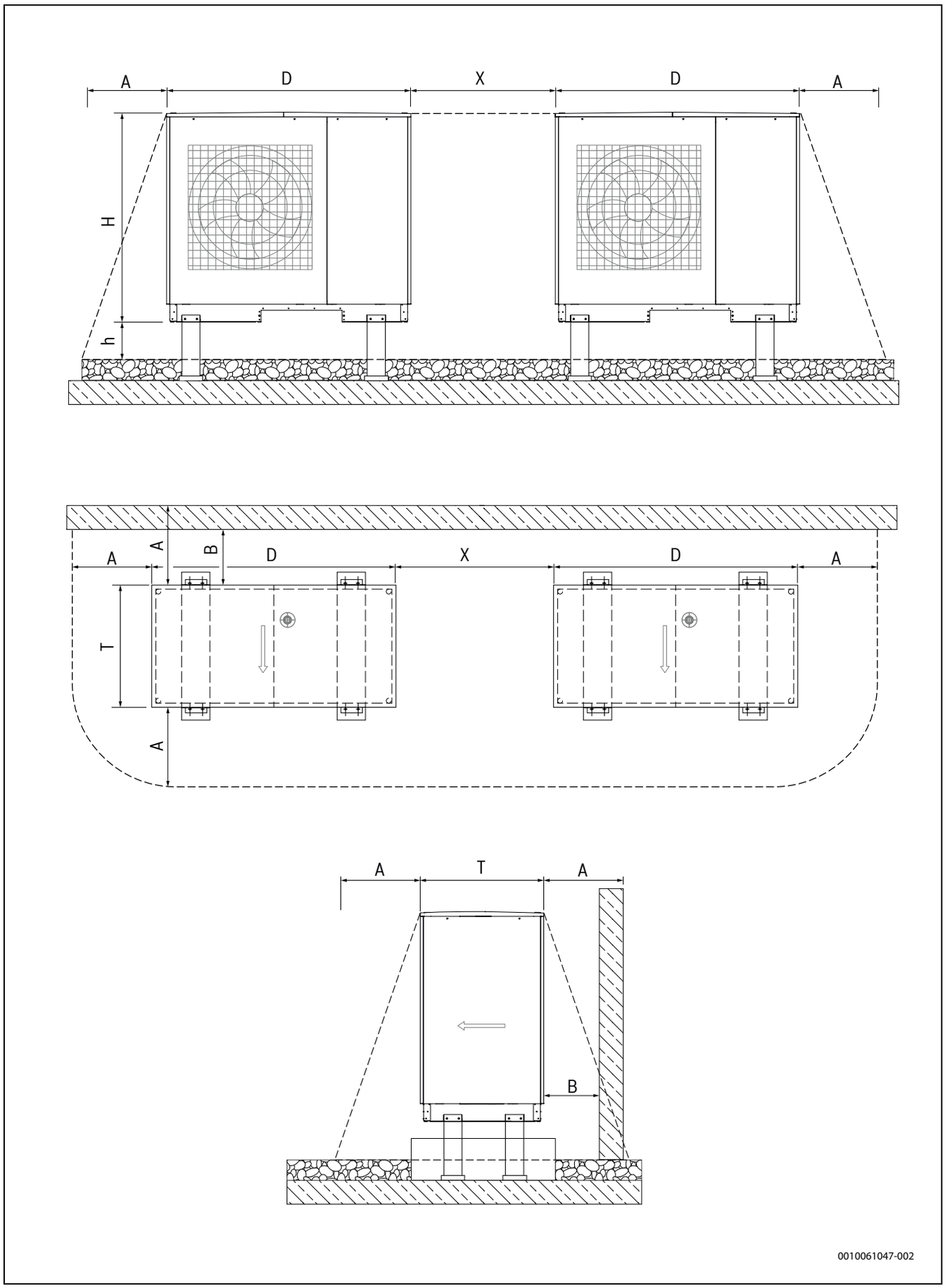

Fig. 23 Variant 1 (Legend → Table 9, page 18)

Variant 2: 2 heat pumps one after the other

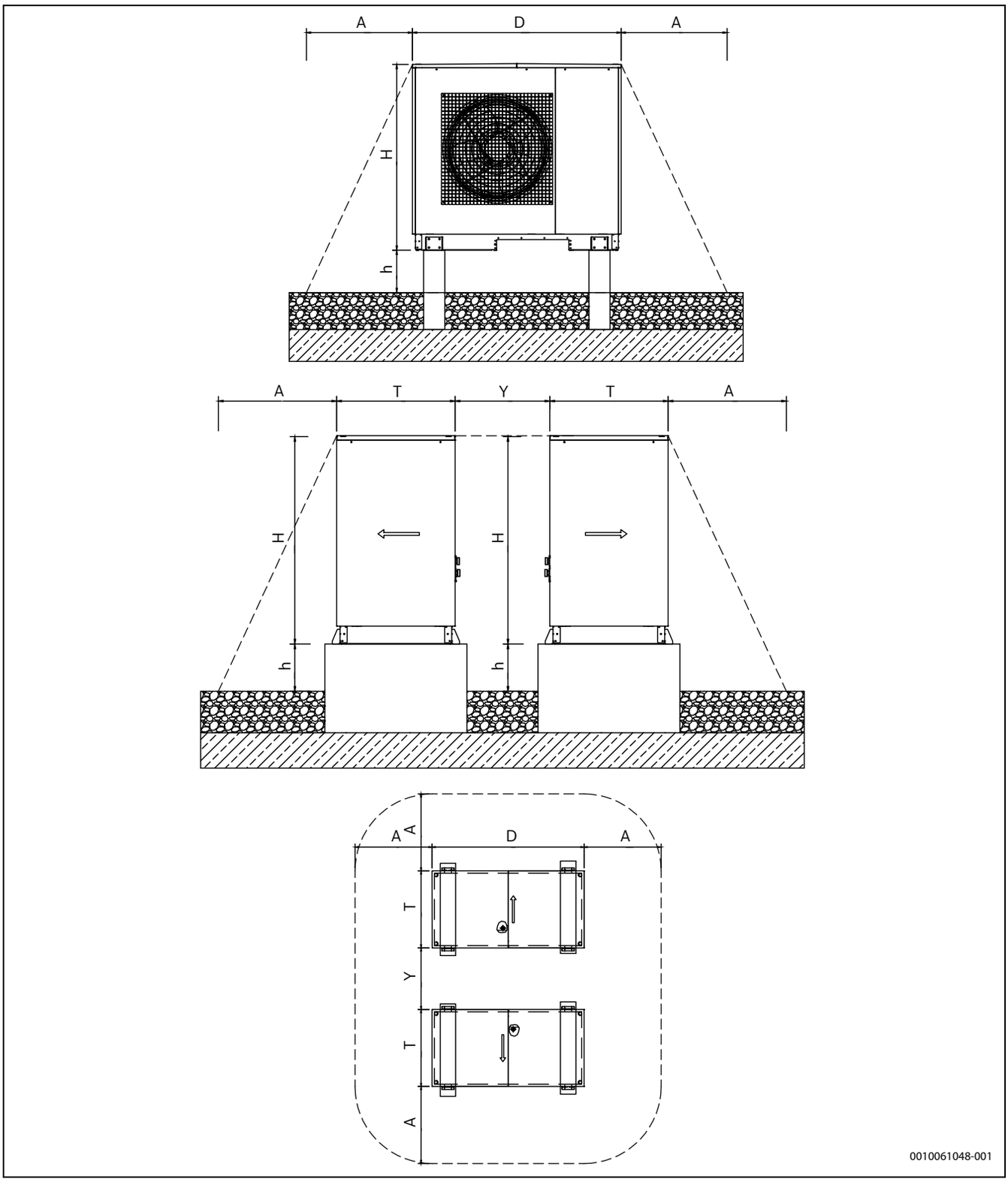

Fig. 24 Variant 2 (Legend → Table 9, page 18)

Variant 3: 3 heat pumps offset

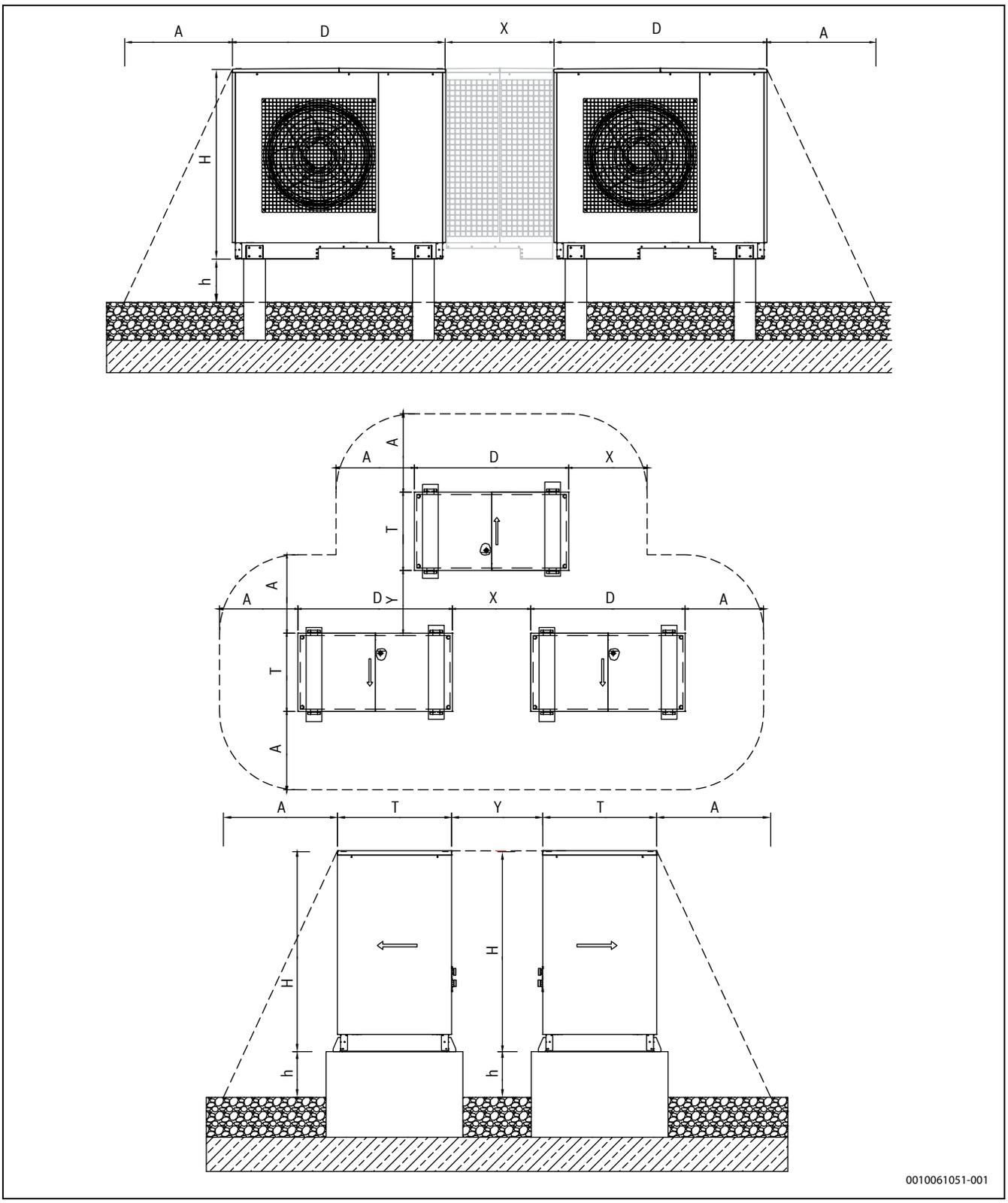

Fig. 25 Variant 3 (Legend → Table 9, page 18)

Variant 4: 3 heat pumps offset

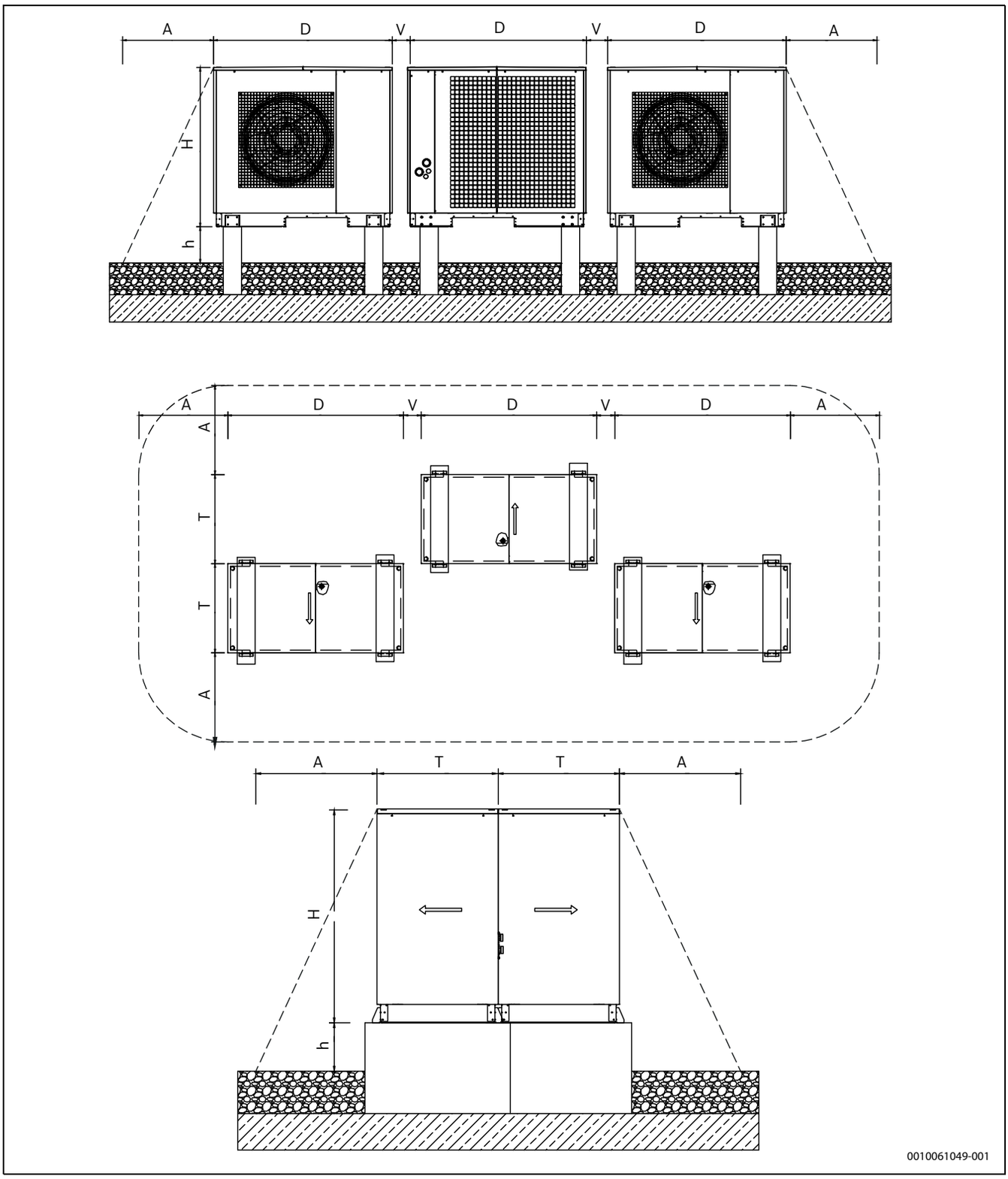

Fig. 26 Variant 4 (Legend → Table 9, page 18)

	Unit	Value
Width D	mm	1800
Depth T	mm	885
Height HK	mm	1517
Distance between heat pumps V	mm	200
min. foundation height h	mm	400
min. protection zone A[1)]	mm	1500
min. clearance WP-WP X	mm	1000
min. clearance WP-WP Y	mm	800
min. wall clearance B[2)]	mm	800
Total width of dual cascade A+D+X+D+A	mm	7600
Total depth of dual cascade A+T+A	mm	3885
Total height h+H	mm	1917

1) A protection zone must be maintained around the heat pump.

2) The minimum wall clearance B on the intake side is 80 cm. No additional walls must obstruct air distribution.

Table 9 Legend to heat pump cascades with raised installation

	Unit	Value
Width D	mm	1800
Depth T	mm	885
Height HK	mm	1517
Distance between heat pumps V	mm	200
min. foundation height h	mm	<400
min. protection zone A[1)]	mm	1500
min. clearance WP-WP X	mm	1000
min. clearance WP-WP Y	mm	800
min. wall clearance B[2)]	mm	1500
Total width of dual cascade A+D+X+D+A	mm	7600
Total depth of dual cascade A+T+A	mm	3885
Total height h+H	mm	<1917

1) A protection zone must be maintained around the heat pump.

2) The minimum wall clearance B on the intake side is 80 cm. No additional walls must obstruct air distribution.

Table 10 Legend to heat pump cascades with floor-standing installation

4.5 Foundation planning

4.5.1 Set up location and alignment

- Always install the heat pump on a suitable, load-bearing foundation.
- Install the heat pump so that the air discharge direction of the fan is perpendicular to the prevailing wind direction to ensure proper defrosting of the evaporator under high wind loads.
- Installation on the roof is permitted. Observe the specified safety clearances.
- The intake of the and exhaust areas of the fan must not be reduced → Chapter 4.2, page 9.
- The heat pump is not intended for use above 2000 m above sea level.
- Do not install the heat pump in recesses or courtyards. If the heat pump draws in cooled air close to the ground, this may result in property damage or reduced efficiency.

4.5.2 Boiler plinth MS 22

A boiler plinth can be used to raise and provide under-base ventilation for the heat pump installed outdoors. The installation height allows for easy connection of the heat pump to the heating system and ensures a required protection zone of 1.5 metres. The boiler plinth is sold as an accessory.

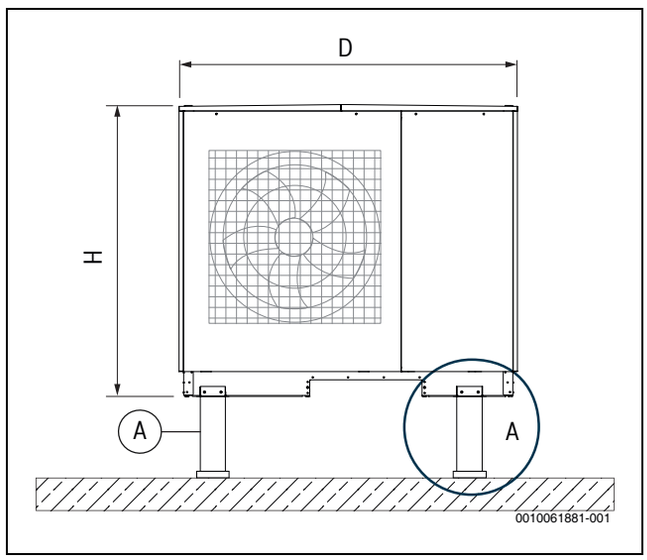

Fig. 27 Boiler plinth, front

A Boiler plinth → Fig. 30, page 19
D 1800 mm
H 1517 mm

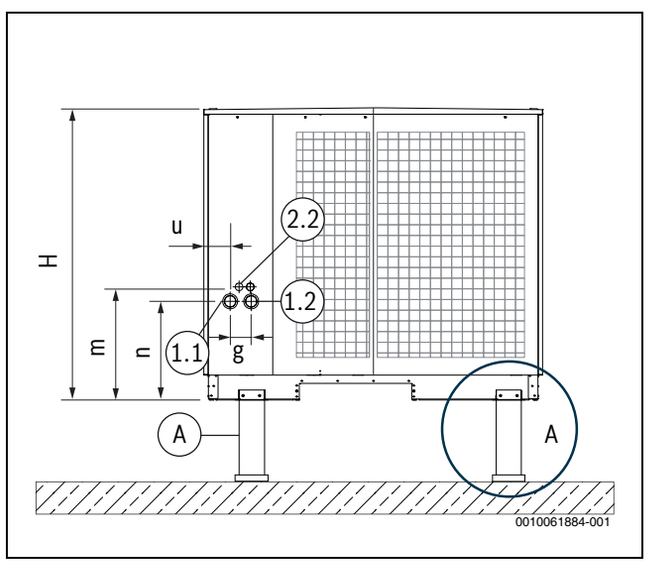

Fig. 28 Boiler plinth – rear

A Boiler plinth → Fig. 30, page 19
H 1517 mm
g 106 mm
m 578 mm
n 530 mm
u 128 mm
1.1 Heating flow R 1 ¼"
1.2 Heating return R 1 ¼"
2.2 Electric cable outlet

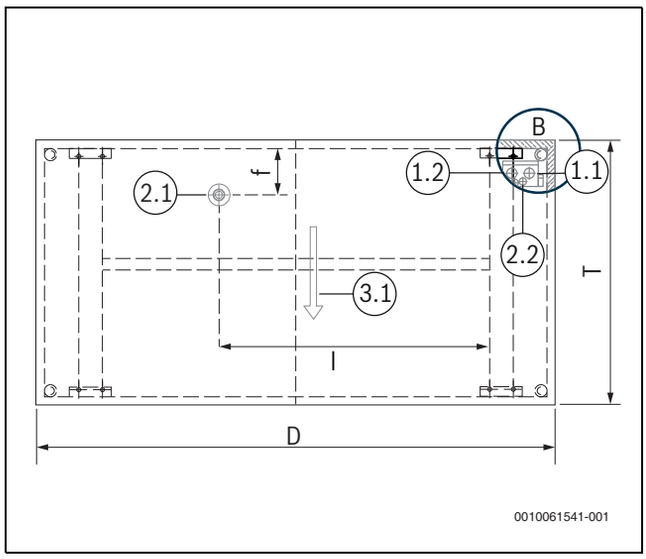

Fig. 29 Boiler plinth, top view

B Detail B→ Fig. 31, page 19
D 1800 mm
T 885 mm
f 226 mm
l 1079 mm
1.1 Heating flow R 1 ¼"
1.2 Heating return R 1 ¼"
2.1 Condensate hose
2.2 Electric cable outlet
3.1 Air direction

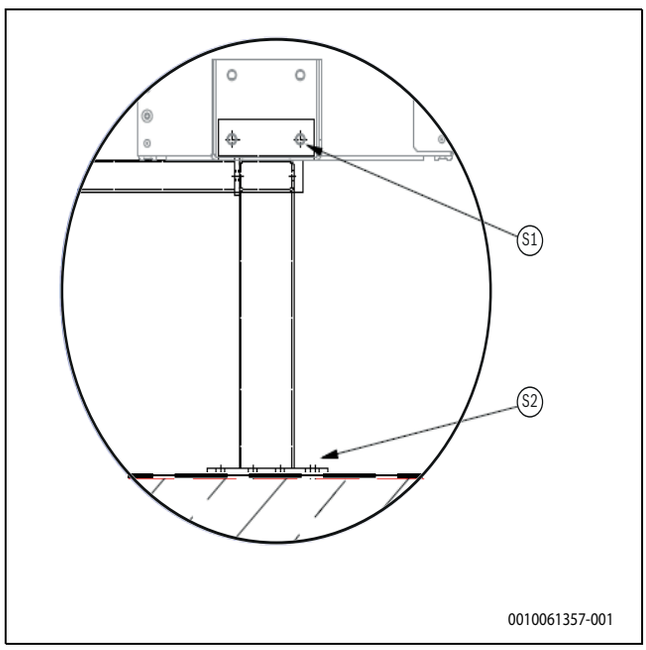

Fig. 30 Detail A

S1 Hexagon socket screw with full thread M12 × 30
8 included in the scope of delivery of the boiler plinth
S2 Hexagon socket screw with full thread, on site - min. M16 × 50

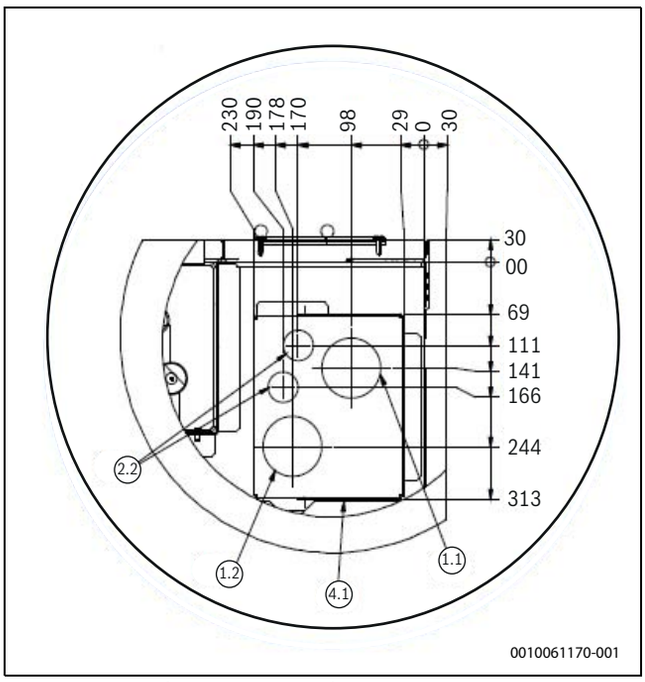

Fig. 31 Detail B (dimensions in mm)

1.1 Heating flow R 1 ¼"
1.2 Heating return R 1 ¼"
2.2 Electric cable outlet
4.1 Installation shaft for connection from underneath

4.5.3 Free-standing foundation

Floor mounting for outdoor air to water heat pumps enables the heat pump to be installed and secured to the foundation. Floor mounting bracket BBW 22-42 is available as an accessory. Scope of delivery includes 4 pieces (including 16 hexagon head bolts with full threads M12 × 30) in grey.

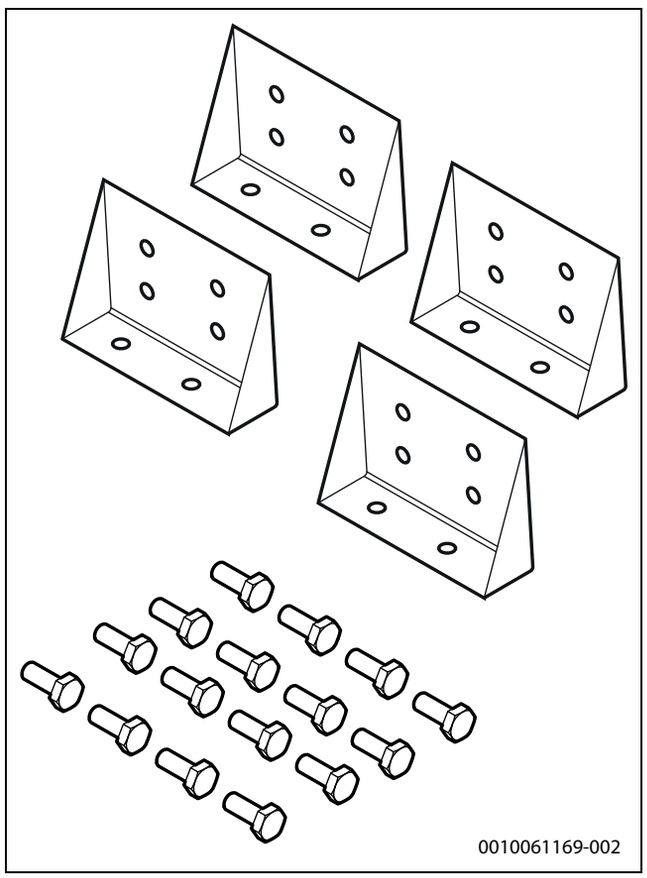

Fig. 32 Floor mounting bracket BBW 22-42

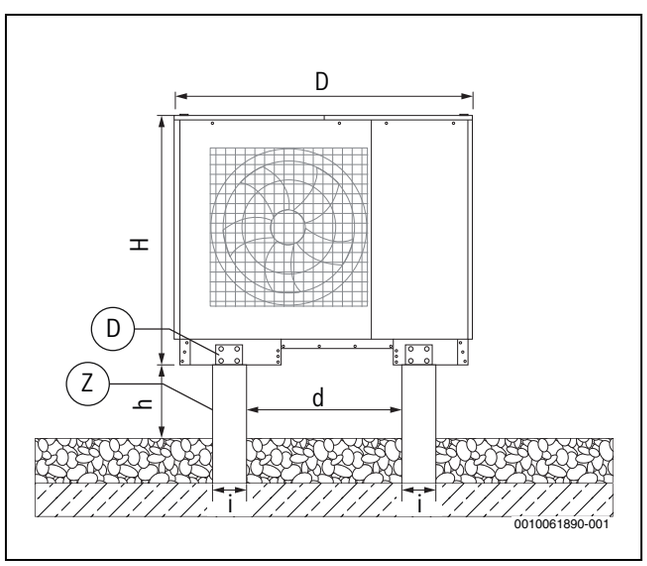

Fig. 33 Free-standing foundation with raised font

[D] Foor mounting bracket BBW 22-42 → Fig. 32, page 20
[Z] Reinforced concrete foundation strip

D 1800 mm
H 1517 mm
d min. 900 mm (under ventilation)
h min. 400 mm
i min. 200 mm

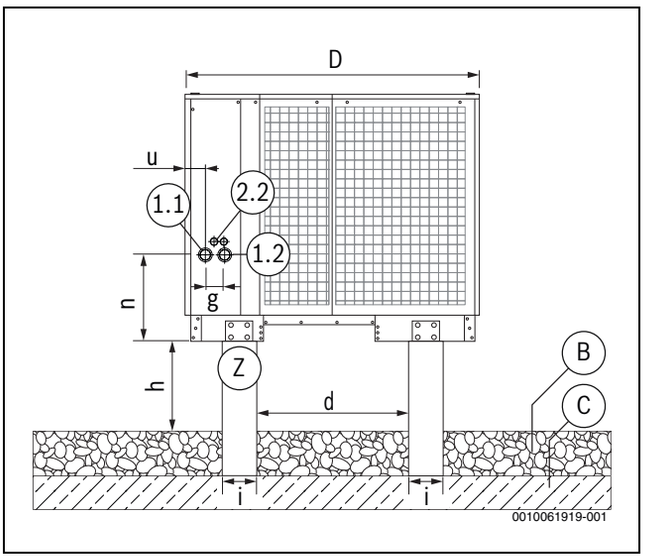

Fig. 34 Free-standing foundation with raised rear

[B] For free drainage of condensed water: a gravel bed for seepage
[C] Frost protection for the foundations: compacted gravel (e.g. 0 to 32/56 mm). The thicknesses of the individual layers must be adapted to local conditions; in doing so, the rules of building trchnology must be observed.
[Z] Reinforced concrete foundation strip

D 1800 mm
d min. 900 mm (under ventilation)
g 106 mm
h min. 400 mm
i min. 200 mm
n 530 mm
u 128 mm

1.1 Heating flow R 1 ¼"
1.2 Heating return R 1 ¼"
2.2 Electric cable outlet

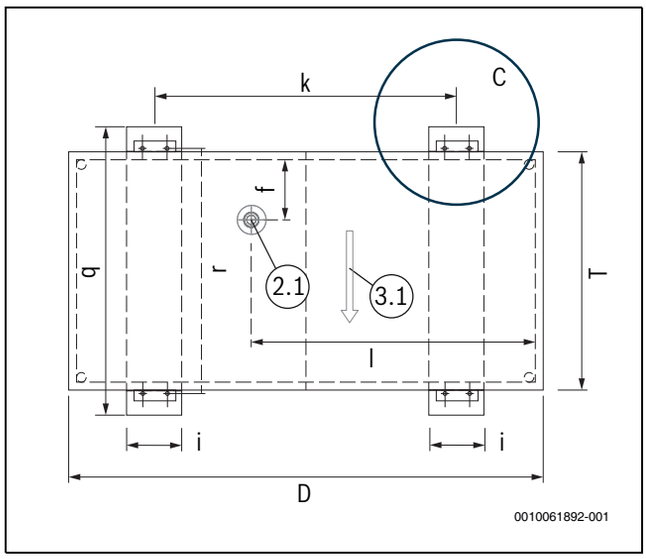

Fig. 35 Free-standing foundation, top view

C Detail C → Fig. Fig. 36 "Detail C", page 21
D 1800 mm
T 885 mm
i min. 200 mm+
f 226 mm
k 1143 mm
l 1079 mm
q min. 1100 mm
r 904 mm
2.1 Condensate hose
3.1 Air direction

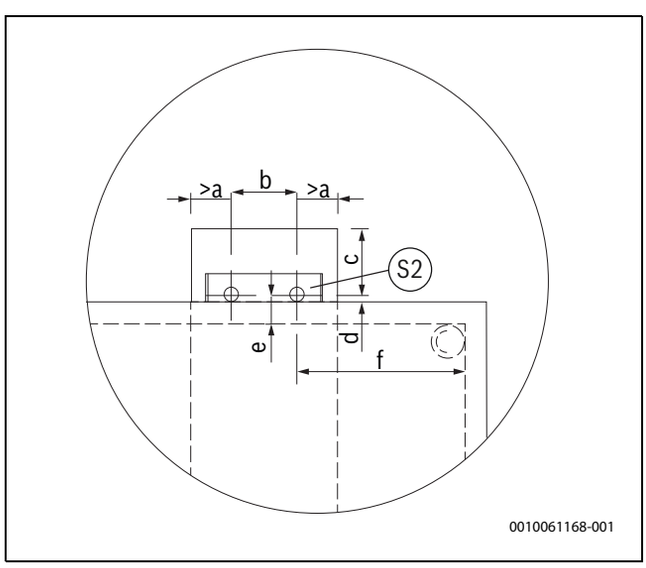

Fig. 36 Detail C

S2 Hexagon head screw with full thread; floor mounting bracket to be attached to the foundation on site - min. M16 × 50
a 55 mm
b 90 mm
c 95 mm
d 10 mm
e 40 mm
f 255 mm

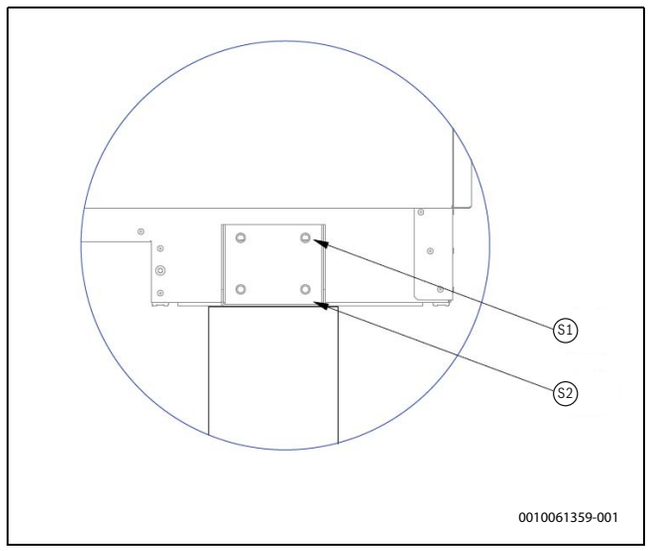

Fig. 37 Detail D

S1 Hexagon socket screw with full thread M12 × 30
16 included in the scope of delivery of floor mounting bracket BBW 22-42
S2 Hexagon head screw with full thread; floor mounting bracket to be attached to the foundation on site - min. M16 × 50

4.6 Transport

DANGER

Risk of death from fire and explosion

If a leak in the refrigerant propane should occur during transport, a flammable atmosphere may form in the transport vehicle.

- ▶ Ensure an adequate air supply during transport.
- ▶ When transporting in a small van with a connection to the passenger compartment, avoid ignition sources such as sparks or smoking and ensure adequate ventilation.

DANGER

Risk of death from fire and explosion

If a leak occurs during transport or storage, a flammable atmosphere may form.

- ▶ Store the unit only in rooms without ignition sources.
- ▶ If possible, store the heat pump above ground and ensure adequate ventilation.
- ▶ Keep the enclosure closed.

DANGER

Risk of death from fire and explosion

If the heat pump is dropped or subjected to impact during transport, flammable refrigerant may leak.

- Protect the unit during transport to prevent it from mechanical damage.
- Avoid setting the unit down abruptly.
- If a hissing noise is audible, oily patches appear, or a leak is detected using a leak detector, the refrigerant must be safely drained by a person trained in the handling of propane.
- Until the refrigerant has been safely drained, avoid sources of ignition in the vicinity and establish a safety zone of 5 m around the heat pump. If the leak occurs inside a building, ventilate the affected area immediately.
- If it is not possible to repair the leak on site, return the heat pump to the manufacturer for repair or maintenance. To do this, remove the propane refrigerant professionally, fill the refrigeration circuit with nitrogen and document this with a note on the unit.

DANGER

Risk of lightning strike

- Do not remain in the immediate vicinity of the heat pump during a thunderstorm.

WARNING

Risk of injury from tipping over

- Secure the heat pump to prevent it from tipping over.
- When transporting on a pallet, observe the centre of gravity.

WARNING

Risk of injury

Working on the unit without protective equipment may result in injuries such as cuts.

- Use personal protective equipment comprising protective gloves, safety shoes, safety goggles and long, closed clothing.

Transport the unit to its final installation site using a pallet truck or crane, and only in its original transport packaging.

Transport by pallet truck

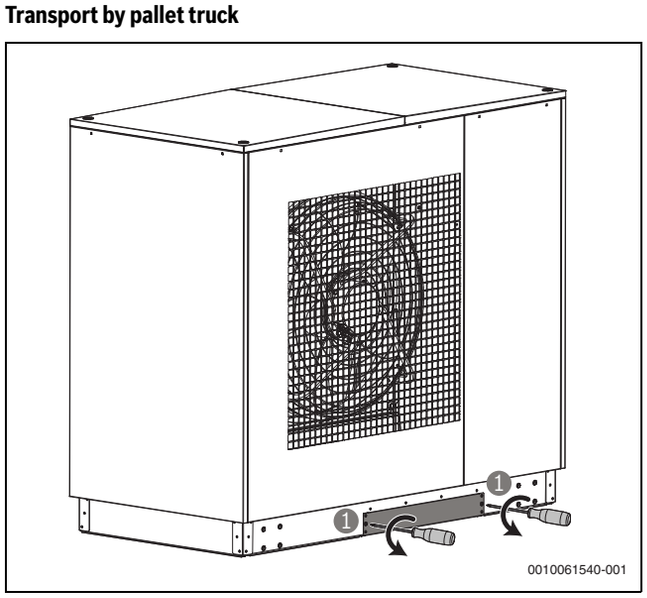

Fig. 38 Open the front of the transport channel

- Carefully loosen the screw blind rivets on the front of the transport channel [1] and remove the panel.
- Carefully loosen the screw blind rivets on the rear of the transport channel and remove the panel.
- Close the transport channel again after transport.

The heat pump must not be stored at temperatures below – 20 °C or above +50 °C.

For transport and storage temperatures, see →Table 15, page 38.

The heat pump must be stored in such a way that it is not exposed to mechanical damage.

During transport, the heat pump must not be tilted by more than 45° in any direction.

Transport, including all corresponding activities such as lifting, charging, setting down, unloading and unpacking, must be carried out by specialists.

Use only suitable transport equipment. Observe the load-bearing capacity of the load-handling unit.

- Clear transport routes and, if necessary, treat them with suitable materials (thaw or grit).
- If possible, transport the unit to its final installation site on the pallet.
- Transport the unit using a pallet truck or crane.

CAUTION

Risk of injury due to tipping

If the crane hook is positioned in the middle, the unit will not be level when lifted.

- Observe the off-centre centre of gravity.

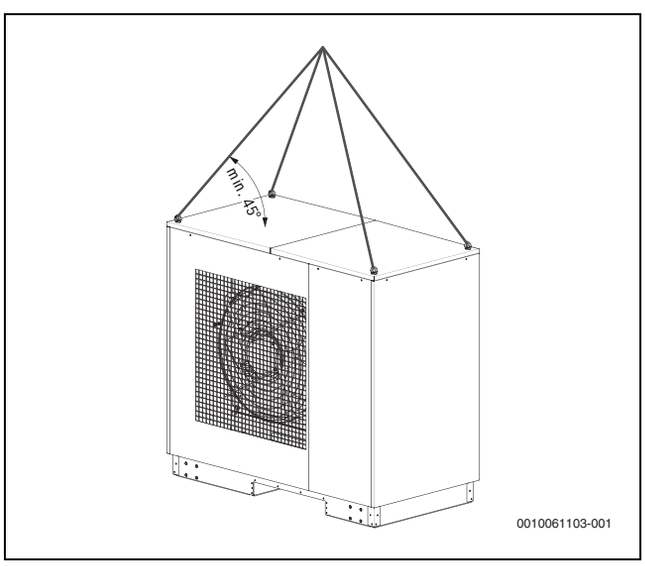

Fig. 39 Lifting the heat pump

Lifting eyes must be ordered as accessories for transport by crane.

- To screw in the lifting eyes, remove the rubber grommets and screw the lifting eyes in as far as they will go.
- After transport, remove the lifting eyes and reseal the housing with the rubber grommets.

DANGER

Risk of electric shock if the enclosure is not closed

Risk of electric shock and property damage due to moisture entering the unit.

- ▶ After transport, unscrew the lifting eyes from the heat pump housing and ensure that the holes in the enclosure are sealed with rubber grommets.

- ▶ After transport, remove the 6 screws and pull out the corresponding transport fittings → Fig. 40, 41, 42, 43, page 23.

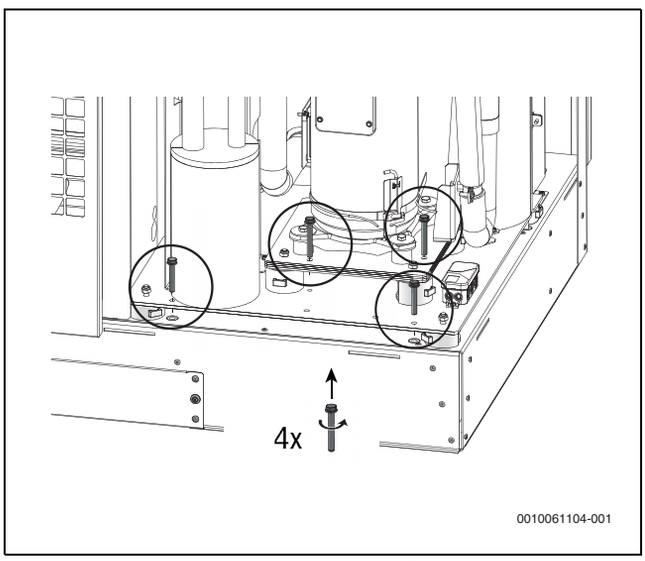

Fig. 40 Removing the screws and transport fittings

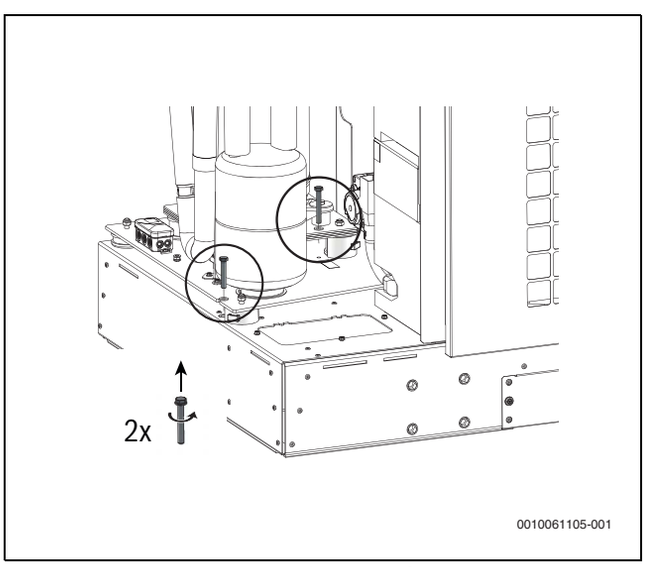

Fig. 41 Removing the screws and transport fittings

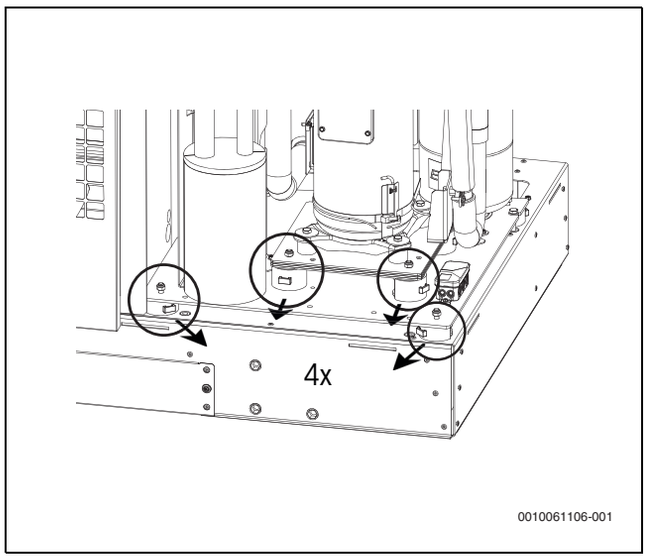

Fig. 42 Removing the screws and transport fittings

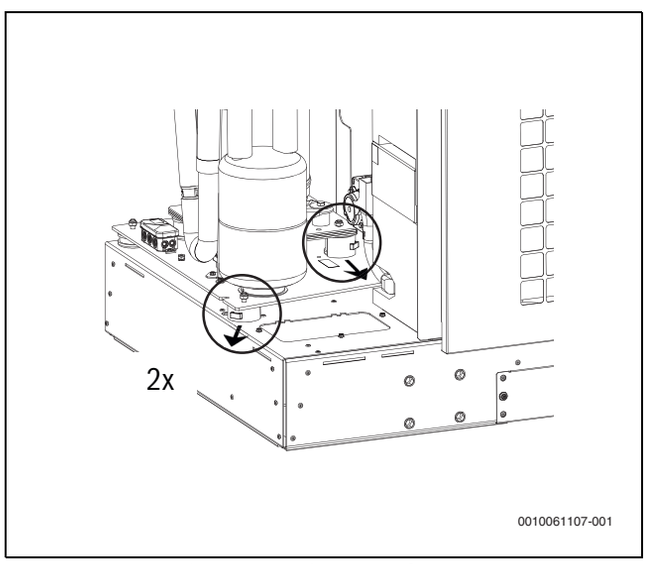

Fig. 43 Removing the screws and transport fittings

In the event of damage during transport, the propane refrigerant must be properly removed from the refrigeration circuit before the damaged unit is returned. If the service technician finds that the refrigeration circuit is still undamaged, the refrigerant must still be completely removed and the refrigeration circuit filled with nitrogen.

4.7 Open the casing panels

4.7.1 Remove the grille panels at the front and rear

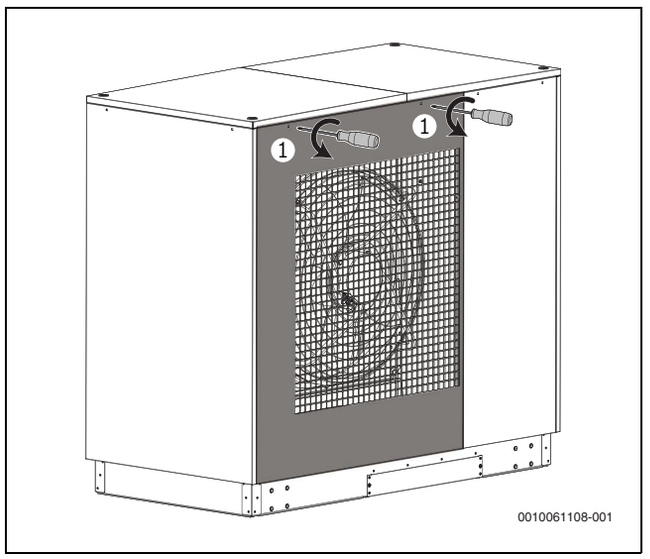

Fig. 44 Loosen the screws at the top

- ▶ Loosen the screws at the top on the respective panel [1].

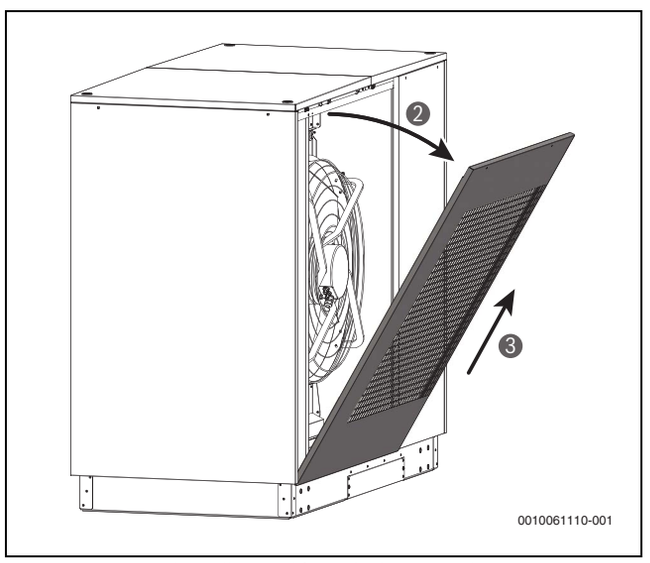

Fig. 45 Remove the grille panel from the base panel.

- ▶ Tilt the panel upwards by approx. 30° towards the front [2].
- ▶ Pull the panel upwards at an angle out of the base plate [3].

4.7.2 Remove the casing panels on the front and rear of the refrigeration compartment

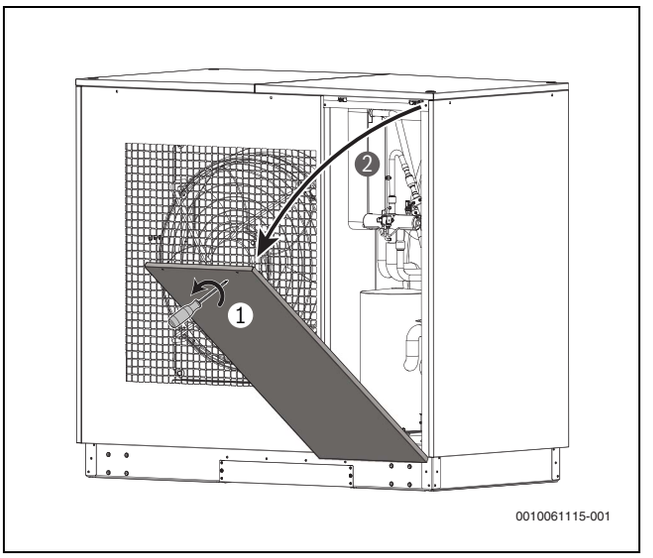

Fig. 46 Loosen the screws at the top and tilt the panel

- ▶ Loosen the screws at the top on the respective panel [1].
- ▶ Tilt the panel upwards by approx. 55° towards the front [2].

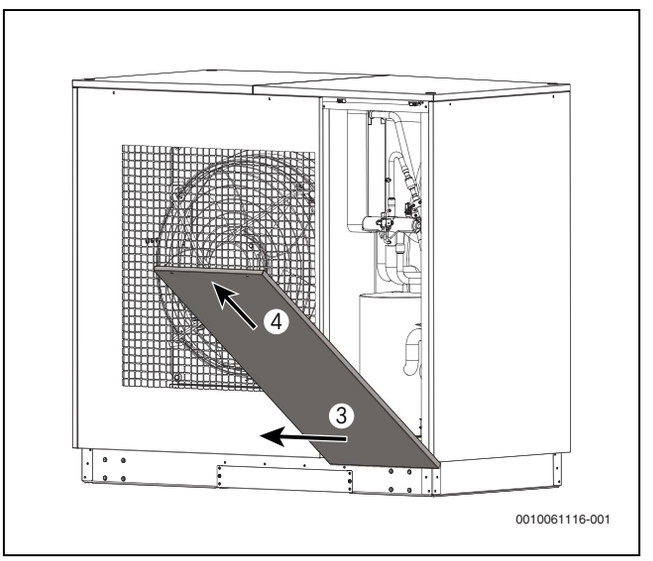

Fig. 47 Slide the panel to the left and remove it

- ▶ With the casing panel tilted, slide it approx. 40 mm to the left as far as it will go [3].
  The panel can be moved past the adjacent trim panels.
- ▶ In this position, pull the panel upwards at an angle out of the base plate [4].

4.7.3 Remove the side casing panels

- ▶ Loosen the screws at the top on the respective panel.

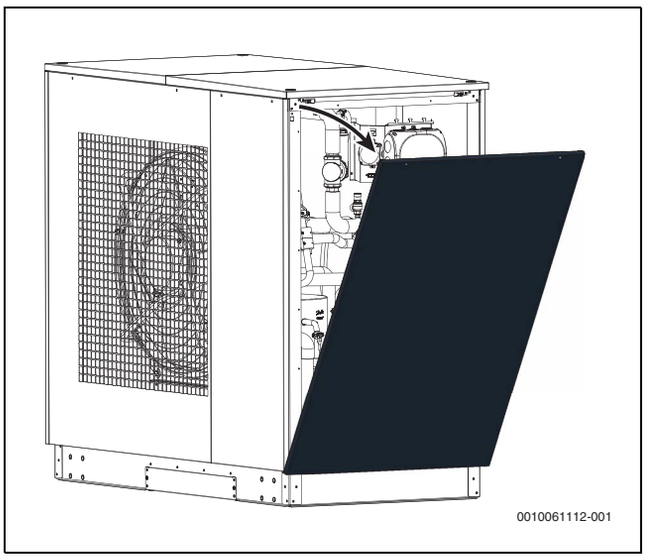

Fig. 48 Tilt the panel

▶ Tilt the panel upwards by approx. 30° towards the front.

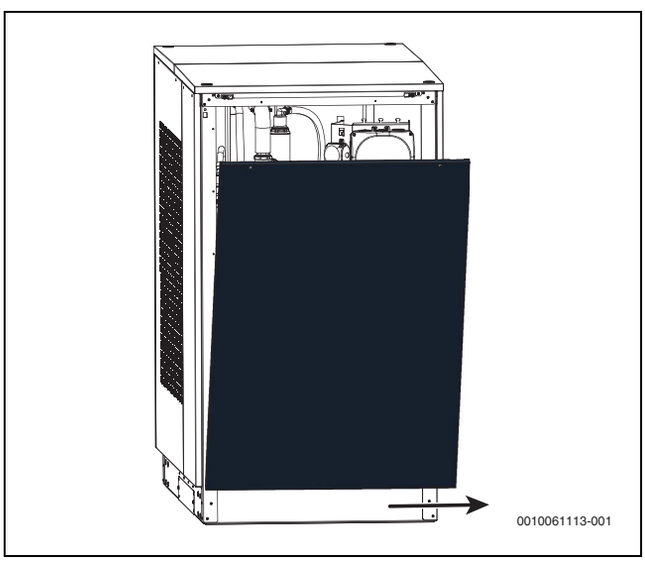

Fig. 49 Slide the panel to the right

▶ With the panel tilted, slide it approx. 40 mm to the right until it stops.

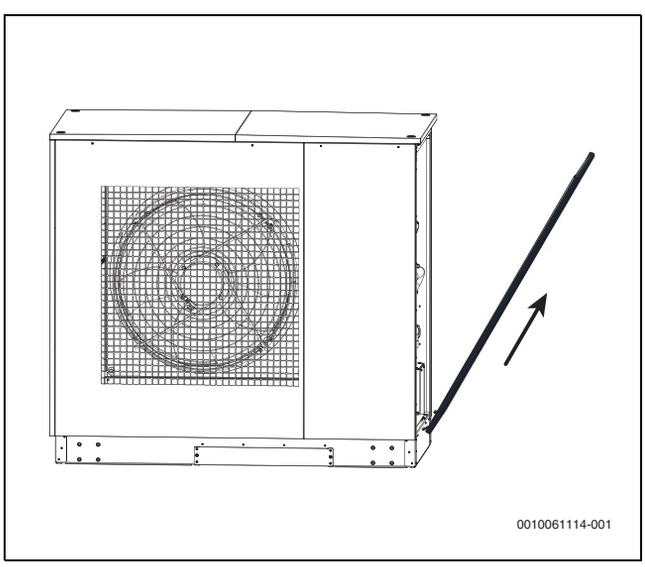

Fig. 50 Remove the panel

▶ In this position, pull the panel upwards at an angle out of the base plate.

4.7.4 Remove the inspection cover

Open the inspection cover to gain access to the space between the evaporator and the fan.

Requirement:
The grille panels on the fan side have been removed
→ Chapter 4.7.1 page 24.

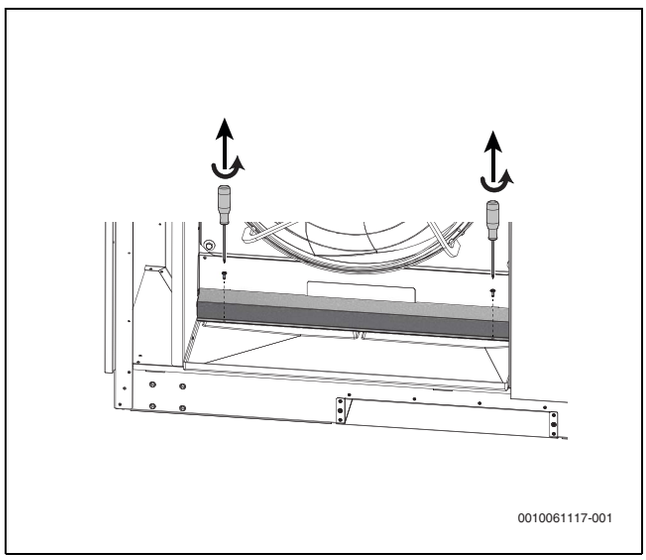

Fig. 51 Remove screw-in blind rivets

▶ Carefully loosen and remove the screw-in blind rivets using a screwdriver.

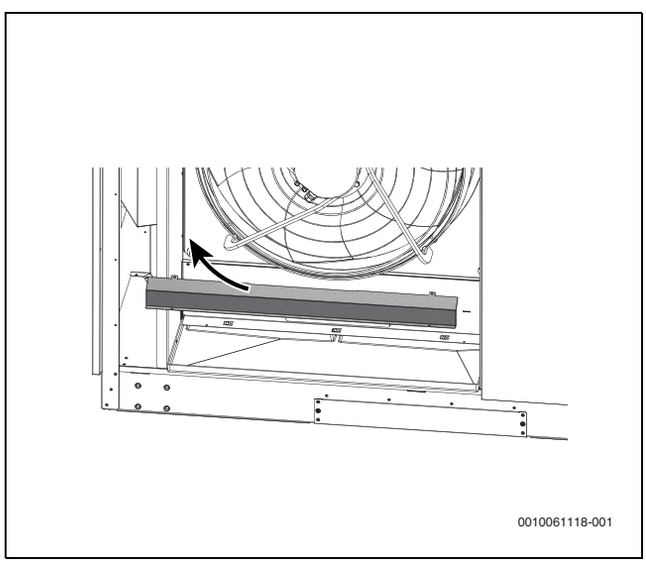

Fig. 52 Remove cover panel

▶ Remove the cable cover panel.

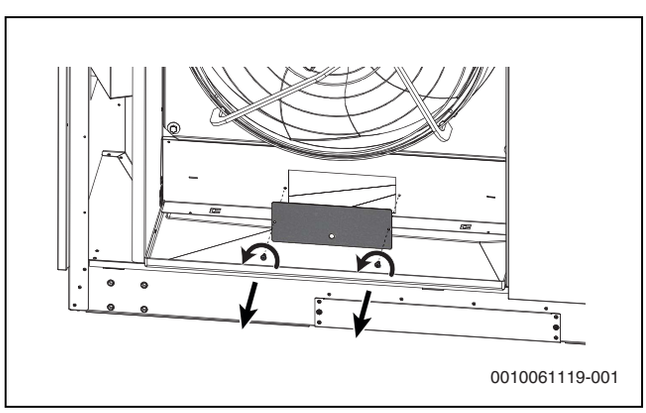

Fig. 53 Remove the inspection cover

- ▶ Undo and remove the screw-in blind rivets.
- ▶ Remove the inspection cover.

4.8 Assembly

- ▶ Make the following connections on the heat pump:
  - Flow and return line from the heating system
  - Condensate pipe
  - Communication line to the heat pump manager (HPC 301)
  - Voltage supply (load/control voltage)

⚠ DANGER

Danger resulting from damage to the heat pump housing

Manipulation or misuse of the heat pump housing results in a risk of injury.

- ▶ Always ensure that the heat pump housing remains undamaged during installation and assembly of the heat pump system.
- ▶ Refrain from any manipulation to the heat pump housing.
- ▶ Do not use the heat pump housing for any purpose other than its intended one (e.g. as a mounting bracket or similar).

⚠ DANGER

Risk of lightning strike

- ▶ Do not remain in the immediate vicinity of the heat pump during a thunderstorm.

⚠ DANGER

Danger to life from electric shock

When working on electrical equipment or live components in wet weather (rain, snow, etc.), there is a danger to life.

- ▶ In the event of rain, snow, etc., ensure that the heat pump housing is kept properly closed.

⚠ WARNING

Working on the unit without protective equipment may result in injuries such as cuts

- ▶ Use personal protective equipment comprising protective gloves, safety shoes, safety goggles and long, , closed clothing.

4.9 Connection on the heat source side

- ▶ Obtain the specifications for the relevant connection sizes → Chapter 11.1, page 36.
- ▶ During installation, note the set pressure of the pressure relief valve installed, which is 5.4 bar.
- ▶ When filling the heating circuit, observe the frost protection valves.

The unit is equipped with frost protection valves in the heating circuit. If the unit is filled when the outside temperature is below 4 °C, or if the heating water temperature falls below 4 °C and there is no flow, the heating water may be drained via the frost protection valves.

- ▶ When filling the heating circuit, ensure that the heating water is at a sufficient temperature and has adequate flow → Chapter 4.9.1 page 26.
- ▶ Seal empty pipes gas-tight after installation on the heat pump.
- ▶ After the installation has been carried out on the heat source side, fill, vent and pressure-test it.

NOTICE

Property damage due to leaks in the hydraulic circuit!

Leaks in the hydraulic circuit can cause property damage due to escaping water.

- ▶ Ensure that the entire hydraulic system remains leak-free.

NOTICE

Property damage due to contamination!

If the heating system is not flushed, contamination, residues of sealing material or similar substances may cause damage to the condenser and thus lead to a total failure.

- ▶ Flush the heating system thoroughly before connecting the heat pump.

NOTICE

Property damage due to incorrect flow distribution!

Pump assemblies with non-return valves ensure for defined flow directions.

- ▶ In the event of incorrect distribution or a drop in volumetric flow rate, check these assemblies, in particular the non-return valves.
- ▶ Where there are multiple heating circuits or parallel connections of heat pumps, non-return valves must be installed in order to prevent incorrect distribution.

4.9.1 System at outdoor temperatures below 4 °C (risk of frost)

Check the outside temperature before filling the system. If it is below 4 °C, there is a risk of frost. In this case, the frost protection valves are open. Procedure for outdoor temperatures below 4 °C:

- ▶ Slide the enclosed hoses (3 pieces) over the frost protection valves.
- ▶ Guide the hose ends out of the unit so that any escaping water is safely drained away.
  When the frost protection valves are open, the water automatically drains out of the unit via the hoses. This prevents water from freezing inside the unit and causing damage.
- ▶ Begin filling the system.
- ▶ Check the water temperature regularly during the filling process.
  Important: If the water is too cold, ensure it is heated, e.g. by preheating or mixing with warmer water. Below 4 °C, the frost protection valves are open.
  A water temperature of more than 4 °C causes the frost protection valves to close automatically.
- ▶ After filling, disconnect the hoses again and remove them from the heat pump.

4.9.2 Converting the water connection

If required, the water connection of the heat pump can be changed from a connection at the rear of the unit to a connection underneath the unit:

Prerequisite:
The side casing has been removed → Chapter 4.7.3, page 24.

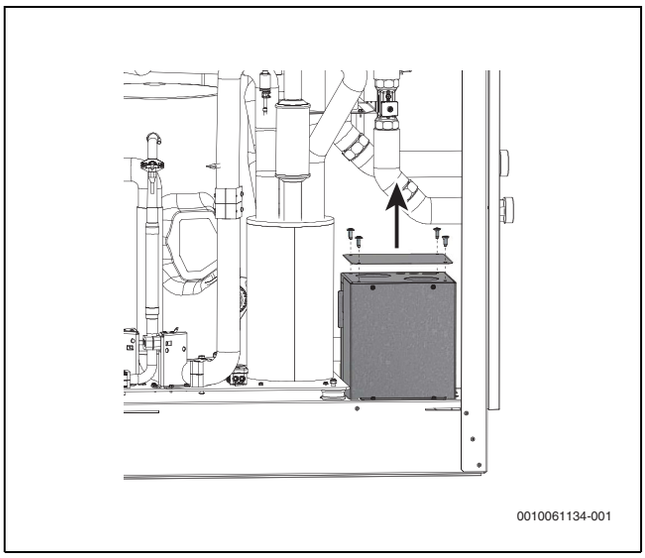

Fig. 54 Remove the cover

▶ Remove the cover from the water connection box.

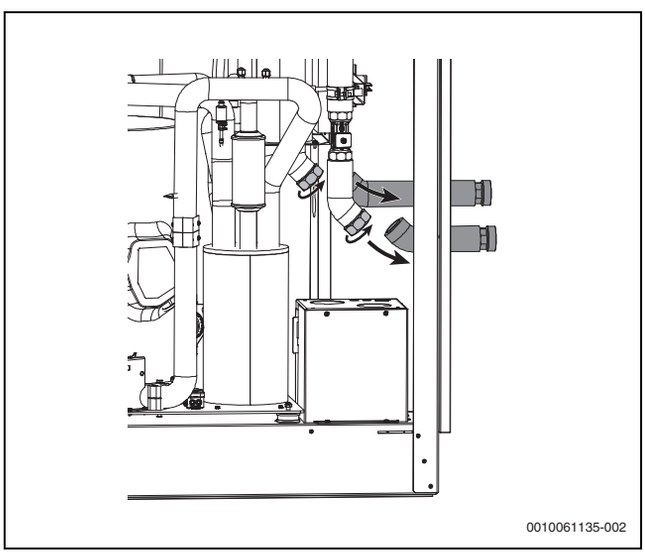

Fig. 55 Disconnect the water pipes

▶ Disconnect the water pipes by loosening the screw fitting.

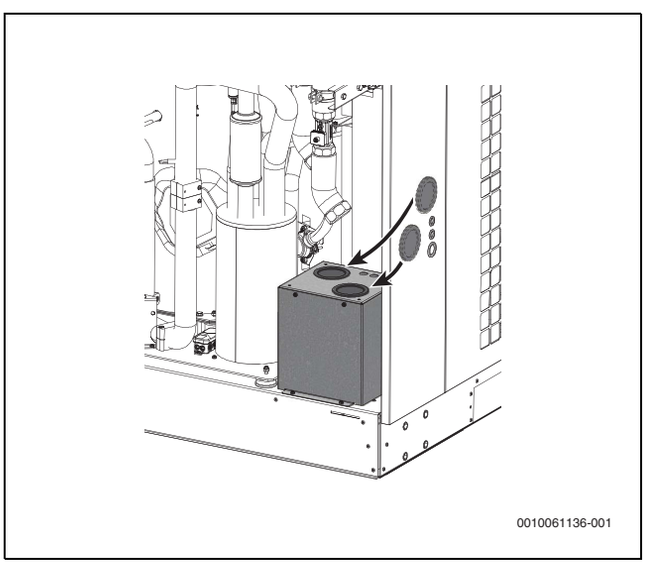

Fig. 56 Insert the grommets

▶ Remove all 5 grommets from the rear cover and insert them into the water connection box.

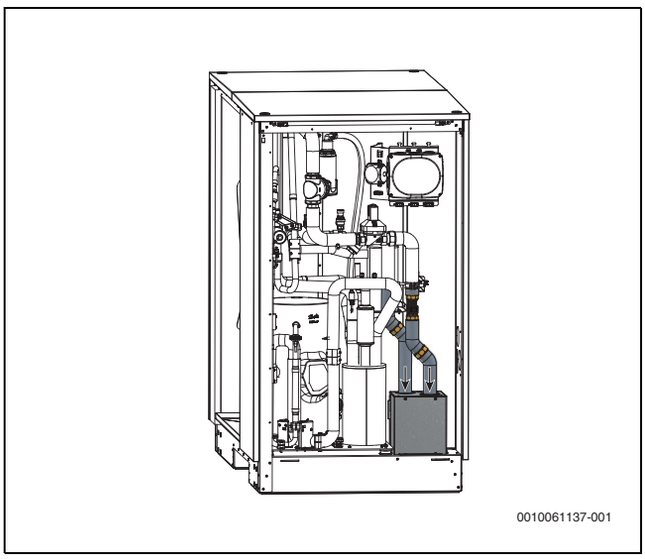

Fig. 57 Connect the water pipes

▶ Feed the water pipes down into the water connection box and close the screw connection again.

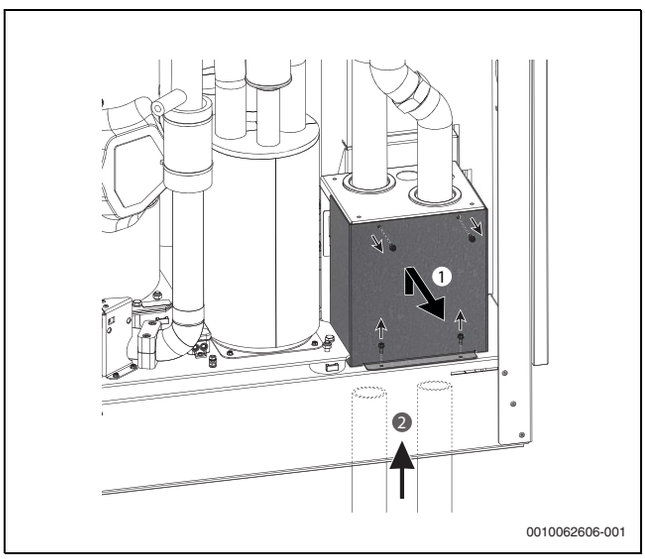

Fig. 58 Install the water connection

▶ Remove the front panel of the water connection box.
▶ Install the water connection of the heat pump.

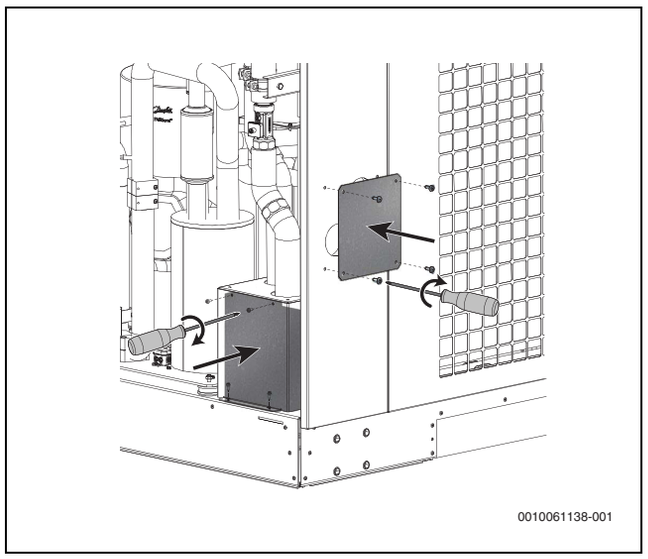

Fig. 59 Mount the panels

- ▶ Close the water connection box again.
- ▶ Close the rear cover with the lid of the water connection box.
- ▶ Mount the remaining casing panels of the heat pump.

4.9.3 Water quality in heating systems

CAUTION

Property damage due to unsuitable fill and top-up water!

Unsuitable fill and top-up water can lead to deposits and corrosion. This can reduce the output values of the heat pump or cause damage to the system.

- ▶ Do not use antifreeze (e.g. a water-glycol mixture) in the heating water.
- ▶ Flush the heating system before filling.

Responsibility for water quality lies with the specialist contractor. The fill water must be of potable water quality and comply with VDI 2035.

In addition, the following limit values must be observed:

Assessment criterion	Unit	Concentration range
Electrical conductivity (salt-contaminated operation)	µS/cm	100...500[1)]
Electrical conductivity (low-salt operation)	µS/cm	<100[1)]
pH value		8.2 ...9.5[1)2)3)]
Total hardness	°dH	3.5 ...8.4
Chloride ions (Cl-)	mg/l or ppm	<20
Iron (Fe)	mg/l or ppm	<0.2[1)]
Hydrogen carbonate/ sulphate (HCO_3-/SO_4^{2-})		>1.0
Filterable substances	mg/l	<30

1) Values apply according to VDI2035

2) When using fully demineralised water, ensure that the pH does not fall below the minimum permissible value of 8.2. If the pH falls below this level, it may cause damage to the heat pump.

3) Check this after 12 weeks of operation at the latest.

Table 11 Limit values for fill water

Calculation of the ratio of hydrogen carbonate to sulphate

The hydrogen carbonate content (C_{HCO3}) can be calculated from the acid capacity ($KS_{4.3}$). The value $KS_{4,3}$ is provided in the drinking water analysis by the local waterworks:

- C_{HCO3} = [mg/l] $KS_{4.3}$ * M_{HCO3}
- The molar mass of C_{HCO3} is M_{HCO3} = 61 [mg/mmol]
- The sulphate content SO_4^{2-} [mg/l] is also specified in the drinking water analysis
- The ratio of hydrogen carbonate C_{HCO3} to sulphate SO_4^{2-} can then be calculated as C_{HCO3}/SO_4^{2-}.

- ▶ Before filling the system, check with your local water authority for information regarding potable water quality.

In many regions, the local waterworks provide information on their respective websites, e.g. on water hardness, pH value and a variety of other ingredients.

- ▶ Check the water quality 10 to 12 weeks after filling/commissioning.
- ▶ Document the fill water conditioning, water quality and measures taken in the system manual.

4.9.4 Minimum heating water flow rate and maximum heating water flow rate

The minimum heating water flow rate of the heat pump must be ensured in every operating condition of the heating system, e.g. by installing a dual-differential pressure-free manifold. The maximum volumetric flow must not be exceeded.

- ▶ Ensure the specified nominal flow rate in every operating condition → Chapter 11.1, page 36.
  An integrated flow sensor monitors the required minimum flow rate.

4.9.5 Frost protection

For heat pump systems where frost protection cannot be guaranteed, a means of draining the system should be provided, regardless of the frost protection valves→ Fig. 60, page 29. Provided the heat pump controller and the heating pump are ready for operation, the frost protection function of the heat pump manager will operate. The system must be drained if the heat pump is decommissioned or in the event of a power failure. The unit is equipped with frost protection valves in the heating circuit.

- ▶ When filling the heating circuit, observe the instructions in → Chapter 4.9, page 26.

The unit is not approved for operation with glycol antifreeze.

The heat pump manager must be continuously supplied with power to ensure frost protection.

To prevent damage to the heat pump at temperatures < 4 °C, a second heat source, powered by electricity or fossil fuels, must be installed. The regulation and control of this heat source can be implemented via the heat pump manager (details are described in the installation and operating instructions of the heat pump manager).

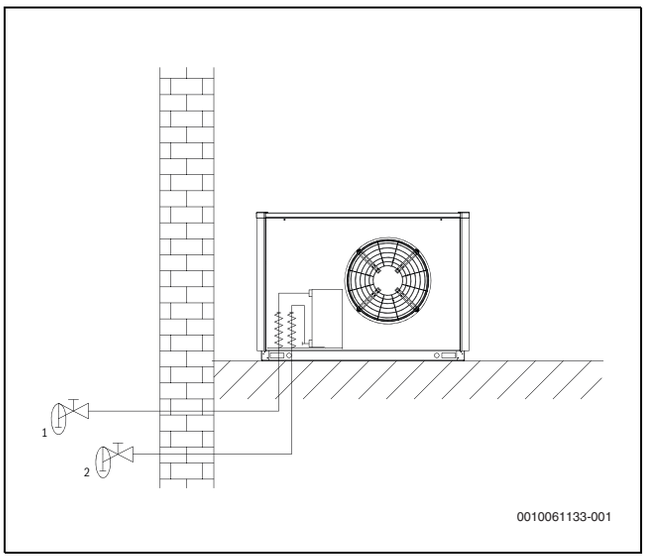

Fig. 60 Frost protection

4.9.6 Integration of heat pumps into existing systems (modernisation project)

The existing heat distribution network (pipe materials, connection types, etc.) and the existing heating surfaces (e.g. radiators, underfloor heating, etc.) may affect the quality of the water in existing buildings. In particular, when using welded steel pipes or pipes that are not oxygen-diffusion-tight, deposits, scale, sludge or similar may be present, which can cause damage to the heat pump system. This can lead to the heat pump failing completely.

▶ To avoid this, the following measures must be observed:
- Ensure that the water content and quality are correct.
- Flush the hydraulic system.
- If contamination of the heating water is to be expected during operation, a suitable maintenance schedule for the dirt trap must be established by a qualified person and adhered to.
- If sludge or ferromagnetic particles are expected in the hydraulic system, provide a sludge separator or magnetite separator on site before the medium enters the heat pump. The cleaning intervals must be determined by a competent and qualified person.
- Ensure that no oxygen enters the heating circuit of the heat pump. If oxygen ingress is expected, we recommend a separation, e.g. by means of a separating exchanger (plate heat exchanger).

4.10 Temperature sensor

The following temperature sensors are already installed or must be mounted additionally:

- Outdoor temperature sensor (R1; NTC-2), supplied with the heat pump manager
- Secondary circuit return temperature sensor (R2; NTC-10), installed
- Flow monitoring, flow (R3.1; PT1000), installed
- Demand sensor (R2.2; NTC-10), supplied with the heat pump manager

4.11 Sensor curve

The temperature sensors (NTC-10) to be connected to the heat pump manager (HPC 301) must correspond to the sensor curve shown → Fig. 62, page 30. Exceptions are the outdoor temperature sensor (NTC-2) included with the heat pump → Fig. 61, page 30 and the pre-installed flow sensor (PT1000).

Temperature [°C]	NTC-2 [k Ω]
-20	14.6
-15	11.4
-10	8.9
-5	7.1
0	5.6
5	4.5
10	3.7
15	2.9
20	2.4
25	2.0
30	1.7
35	1.4
40	1.1
45	1.0
50	0.8
55	0.7
60	0.6

Table 12 Sensor curve NTC-2

Temperature [°C]	NTC-10 [k Ω]
-20	67.7
-15	53.4
-10	42.3
-5	33.9
0	27.3
5	22.1
10	18.0
15	14.9
20	12.1
25	10.0
30	8.4
35	7.0
40	5.9
45	5.0
50	4.2
55	3.6
60	3.1

Table 13 Sensor curve NTC-10

Temperature [°C]	PT1000 [k Ω]
-20	0.92
-15	0.94
-10	0.96
-5	0.98
0	1.0
5	1.02
10	1.04
15	1.06
20	1.08
25	1.10
30	1.12
35	1.14
40	1.16
45	1.17
50	1.19
55	1.21
60	1.23
70	1.27
80	1.31
90	1.35
100	1.39
110	1.42
120	1.46
130	1.50
140	1.54

Table 14 Sensor curve PT1000

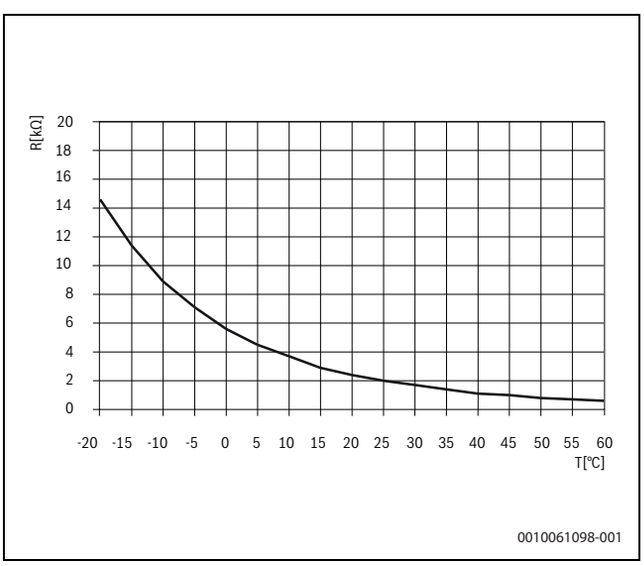

Fig. 61 Sensor curve NTC-2 according to DIN 50350

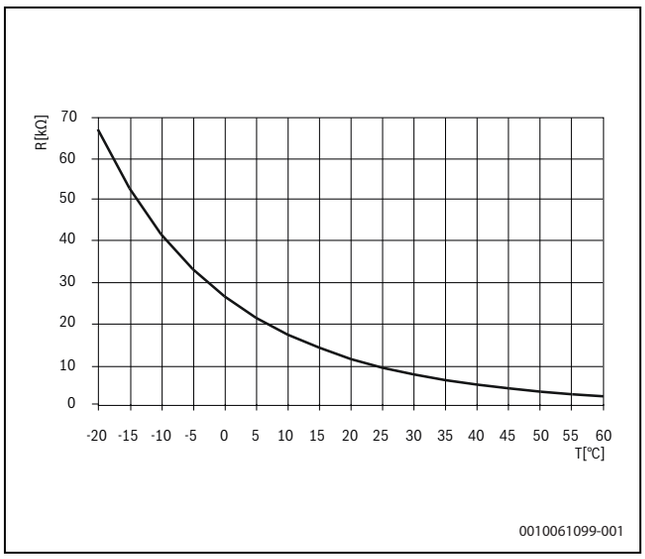

Fig. 62 Sensor curve NTC-10

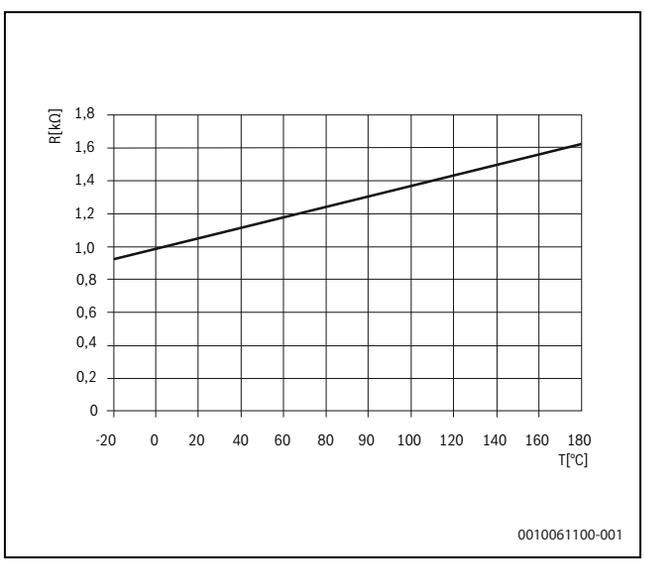

Fig. 63 Sensor curve PT1000

4.12 Electrical connection

All electrical connection work must be carried out only by a qualified electrician or a specialist authorised to perform specific tasks, in accordance with the following points:

- Installation/operating instructions
- Country-specific installation regulations
- Technical connection requirements of energy suppliers and network operators
- Local conditions

To ensure the frost protection function, the heat pump manager must only be electrically de-energised for a short period and water must continue to flow through the heat pump. On the heat pump, feed all supply cables through the designated free diaphragms into the junction box. Secure the cables using strain reliefs.

This unit complies with IEC 61000-3-12 provided that the short-circuit capacity Ssc at the connection point of the customer system to the public grid is ≥ 4616 kVA. It is the responsibility of the installer or unit user, if necessary after consultation with the network operator, to ensure that this unit is connected only to a connection point with a short-circuit capacity Ssc of ≥ 4616 kVA. The heat pump meets the requirements of EN 61000-3-12 in accordance with the THC values specified in Table 3 of the standard, with a minimum value of Rsce ≥ 300. The heat pump is designed for areas accessible to the general public, as well as for areas not accessible to the general public. The following guidelines must be strictly adhered to when installing and operating the system.

4.12.1 Electrical power connection work

Before commencing any work on electrical power connections, observe the five electrical safety rules:

- Switch off
- Secure against switching back on
- Make sure the power supply is disconnected at all terminals
- Earth and short-circuit
- Cover or block off nearby live parts

After switching off the power, wait five minutes until all components are de-energised. Refer to the electrical documentation for the precisely defined stripping lengths of the individual connection cables (power terminal, control voltage, communication cable). Route a total of 3 cables to the heat pump:

Power terminal

The power terminal for the heat pump is made using a standard 5-wire cable (NYM-J 5 × 4 mm^2) to be supplied by the customer. The exact dimensioning of the cable is the responsibility of the electrician, taking into account local conditions and applicable regulations. Select the cable cross-section in accordance with the power input of the heat pump and the relevant VDE (EN) and VNB regulations → Chapter 11.1 page 36.

Provide an all-pole disconnection in the power supply for the heat pump with a contact gap of at least 3 mm (e.g. power supply company isolating contactor, power contactor).

A 3-pole circuit breaker with common tripping of all power conductors provides short-circuit protection, taking into account the design of the internal wiring (tripping current according to → Chapter 11.1 page 36). The relevant components in the heat pump are installed with an internal overload protection. When connecting, ensure the clockwise rotation of the power input. Phase sequence: L1, L2, L3.

Control voltage

The control voltage is supplied via the heat pump manager (HPC 301). For this purpose, route a 3-pole cable (NYM-J 3 × 1.5 mm^2) in accordance with the electrical documentation. For further information on wiring the heat pump manager, please refer to the relevant operating instructions.

Communication cable

A shielded and twisted communication cable 4 × 0.75 mm^2 (J-Y(ST)Y ..LG) (not included) connects the heat pump manager (HPC 301) to the refrigeration circuit controller -N0 installed in the heat pump. Please refer to the operating instructions for the heat pump manager and the electrical documentation for more detailed instructions.

The communication cable is essential for the operation of outdoor air-to-water heat pumps. It must be shielded and routed separately from the load cable.

4.12.2 Connection of demand sensor

The heat pump manager (HPC 301) is supplied with the demand sensor R2.2 (NTC-10). It must be installed in accordance with the hydraulic system used → Chapter 11.7 page 52. If no demand sensor is connected, in the event of a communication failure with the heat pump manager, control of the 2nd heat generator is not possible. The return temperature sensor R2, which is integrated in the heat pump, is active when the compressor is running and must not be disconnected. Sensor cables can be extended by up to 50 m using 2 × 0.75 mm^2 cables.

4.12.3 Connection option for primary circuit pump M16

The primary pump (auxiliary circulation pump) M16 is controlled via the heat pump manager. Alternatively, this can be done via the heat pump itself.
A 230 V signal (ON/OFF) and a set value (0..10 V/PWM) are provided. Use the set value signal to optimise the overall system and achieve the efficiency values.
For pumps without a set value signal, observe the limit values specified in the unit information. Alternative pump connection options (e.g. continuous voltage to the pump, ON/OFF via volt free contact, ON/OFF via set value, high connected load) must be provided on site and implemented depending on the pump type. For this purpose, observe the specifications of the pump manufacturer. Obtain more details from the electrical documentation.

4.12.4 Frost protection

CAUTION

Property damage due to frost!

If the heat pump manager is de-energised, water will no longer circulate through the heat pump and frost may cause property damage.

- ▶ Do not de-energise the heat pump manager to ensure the frost protection function of the heat pump remains active.
- ▶ The primary circuit pump M16 must be connected either to the heat pump manager or to the heat pump (terminal box M16).

Regardless of the settings of the heating pumps, these always run during heating, defrosting and frost protection modes. In systems with multiple heating circuits, the 2nd/3rd heating pump has the same function.

The heat pump manager must be continuously supplied with power to ensure frost protection.

To prevent damage to the heat pump at temperatures < 4 °C, a second heat source, powered by electricity or fossil fuels, must be installed. Regulation and control can be implemented via the heat pump manager (details are described in the installation and operating instructions of the heat pump manager).

5 Commissioning

Commissioning must be carried out by a qualified installer or Bosch service technician. To ensure correct commissioning, specialist tools must be used.

CAUTION

Property damage caused by operation with transport fitting

- ▶ Remove the transport fitting before commissioning.

WARNING

Risk of injury

Working on the unit without protective equipment may result in injuries such as cuts.

- ▶ Use personal protective equipment comprising protective gloves, safety shoes, safety goggles and long, , closed clothing.

5.1 Preparation

Before commissioning, the following points must be carried out and checked:

- The housing covers of the heat pump are mounted on all sides.
- The protection zone has been maintained in accordance with → Chapter 4.2, page 9, and there are no ignition sources or combustible materials present.
- All connections to the heat pump have been fitted as described in → Chapter 4.9, page 26.
- Solenoid valve Y19 is controlled via the refrigeration circuit controller to ensure water flow.
  – Delivery condition: Solenoid valve is closed.
- The heating circuit is filled and tested.
- All valves in the heating circuit that could impede the correct flow are open.
- The air intake/outlet path is clear.
- The settings of the heat pump manager (HPC 301) have been adjusted to the heating system in accordance with its operating instructions.
- Condensate drain is ensured.
- Before installing the heat pump, flush the hydraulic system, including the supply pump to the heat pump, correctly. The heat pump may only be connected to the hydraulic system once flushing has been completed.
- Inspect the dirt traps fitted as standard in the unit or supplied for installation 4 weeks at the earliest and 8 weeks at the latest after the heat pump has been commissioned or changes have been made to the heating system, and clean them if necessary! Depending on the degree of contamination, schedule further cleaning intervals, which must be determined and carried out by a competent and qualified person. If there is no excessive accumulation of dirt, an interval of 1 year is appropriate.
- The minimum water temperature (18 °C) required for commissioning is present in the system (otherwise the heat pump will not start).

5.2 Procedure

The heat pump is commissioned using the heat pump manager (HPC 301). The settings must be configured in accordance with the operating instructions. Commissioning is not possible if the heating water temperature is below 7 °C. The water in the buffer tank must be heated to at least 20 using the 2nd heat generator.

Follow the procedure below to ensure trouble-free commissioning:

- ▶ Close all consumer circuits.
- ▶ Actuate solenoid valve Y19 via the heat pump manager.
  Water flow can only be ensured after the solenoid valve has been opened!
  As-delivered condition of the solenoid valve = closed.
- ▶ Select the "Winter" operating mode via the heat pump manager.
- ▶ Start the "Commissioning" programme in the "Special functions" menu.
- ▶ Wait until a return temperature of at least 29 °C is reached.
- ▶ Then slowly reopen the heating circuit valves one by one, so that the heating water flow rate is gradually increased by slightly opening the relevant heating circuit. The heating water temperature in the buffer tank must not fall below 24 °C, to ensure that the heat pump can defrost at any time. Once all heating circuits are fully open and a return temperature of at least 20 °C is maintained, commissioning is complete.

6 Inspection and service

6.1 Maintenance

Regular maintenance of the system ensures long-term efficient and trouble-free operation.

DANGER

Danger to life from fire and explosion!

If a leak of the refrigerant propane occurs in the event of a fault, a flammable atmosphere may form.

- ▶ Avoid ignition sources and fire loads in the protection zone.
- ▶ Keep the enclosure closed.

WARNING

Risk of injury and damage to property due to improper handling!

- ▶ Work on the heat pump must only be carried out by persons with the knowledge specified in → Chapter 1.2, page 3.

NOTICE

Property damage due to leaks in the hydraulic circuit!

Leaks in the hydraulic circuit can cause property damage due to escaping water.

- ▶ Ensure that the entire hydraulic system remains leak-free.

- ▶ To protect the paintwork, do not lean objects against or place them on top of the unit. Wipe the external parts of the heat pump with a damp cloth and commercially available cleaning agents.
- ▶ Do not use cleaning agents containing sand, soda, acid or chloride, as these will damage the surface.
- ▶ Use only original spare parts.

6.2 Cleaning on the heat source side

Determine the cleaning intervals yourself depending on the degree of contamination of the system.

6.2.1 Cleaning the sieve insert and, if necessary, the sludge/ magnetite separator

- ▶ Depressurise the heating circuit in the area of the dirt trap.
- ▶ Unscrew the sieve chamber.
- ▶ Remove and clean the sieve insert.
- ▶ Reassemble the components in reverse order.
- ▶ Ensure the sieve insert is fitted correctly and that the screw connection is tight.

6.2.2 Flushing the system

Oxygen can form oxidation products (rust) in the heating circuit, particularly when steel components are used. These enter the heating system via valves, circulation pumps or plastic pipes. Particular care must therefore be taken to ensure an oxygen-tight installation, especially where the entire pipework is concerned.

Residues of lubricants and sealants can also contaminate the heating water. If the contamination is so severe that it reduces the efficiency of the condenser of the heat pump, the system must be cleaned by an installation company.

- Based on current knowledge, it is recommended to carry out the cleaning using a 5 % phosphoric acid solution or, if cleaning is required more frequently, a 5 % formic acid solution.
- The cleaning fluid must be at room temperature.
- When installed, the heat exchanger can only be flushed in the intended flow direction.

- It is recommended to connect the flushing unit directly to the supply and return lines of the condenser of the heat pump in order to prevent acidic cleaning agents from entering the heating system circuit.
- Rinse thoroughly afterwards with suitable neutralising agents to prevent damage caused by any cleaning agent residues remaining in the system.

▶ Use acids with caution.
▶ Always comply with the regulations of the Employer's Liability Insurance Associations as well as the manufacturer's instructions for the cleaning agent.

6.3 Cleaning the air side

- In extreme weather conditions (e.g. snow drifts), ice may occasionally form on the intake and outlet grilles. Clear ice and snow from the intake and outlet areas to ensure the minimum air flow rate.
- Remove branches, leaves and dirt that have accumulated around the unit at regular intervals.
- Clean the evaporator, fan and condensate drain of any debris (leaves, twigs, etc.) as required.
- Remove the grille panels at the front and rear.
- To clean the condensate drain or the condensate hose, open the access cover if necessary → Chapter 4.7.4 page 25.

7 Troubleshooting

7.1 Troubleshooting

Work on the heat pump for troubleshooting or repair must only be carried out by authorised and competent personnel.

Anyone carrying out work on the refrigeration circuit must hold a certificate of competence in handling flammable refrigerants, or must be supervised by such a person.

DANGER

Danger to life from fire and explosion!

The unit contains an odourless, flammable refrigerant (R290). In the event of a leak, the refrigerant may mix with the surrounding air and create a flammable atmosphere.

▶ Work on the heat pump must only be carried out by persons with the knowledge specified in → Chapter 1.2, page 3.
▶ Avoid ignition sources (open flames, hot surfaces, electrical equipment with ignition sources and static discharge) as well as fire loads within the protection zone.
▶ Do not smoke within the protection zone of the heat pump.
▶ Before and during operation of the unit, check the working environment and the interior of the unit for the presence of R290 using a refrigerant detector.
▶ Use only detectors and tools that are suitable and approved for use with R290 refrigerant.
▶ Cordon off the area around the unit to prevent unauthorised access.
▶ Check the refrigerant circuit for leaks once all installation work has been completed and before connecting the external power supply (load and control voltage).

DANGER

Risk to life due to electric shock!

There is a risk of electric shock if all casing panels are not mounted on the unit.

▶ Disconnect all circuits from the power supply before opening the unit.
▶ Wait 5 minutes until all components are de-energised.

DANGER

Risk of lightning strike!

▶ Do not remain in the immediate vicinity of the heat pump during a thunderstorm.

DANGER

Risk to life due to electric shock!

When working on electrical equipment or live components in wet weather (rain, snow, etc.), there is a danger to life.

▶ In the event of rain, snow, etc., ensure that the heat pump housing is kept properly closed.

CAUTION

Property damage due to leaks in the hydraulic circuit!

Leaks in the hydraulic circuit can cause property damage due to escaping water.

▶ Ensure that the entire hydraulic system remains leak-free.

CAUTION

Malfunction caused by faulty software!

▶ Only authorised software approved by the manufacturer may be installed on the control of the heat pump.

If the condenser (plate heat exchanger) fails due to a fault (e.g. caused by contamination, corrosion, refrigerant leakage or calcification), replace the solenoid valve (Y19), the frost protection valves (HC6), the micro-bubble separator (HC5) and the non-return valve (HC4) during the repair (replacement or cleaning)! If the condenser fails due to contamination, check again that the measures described have been carried out →_Chapter 4.9.6, page 29.

7.1.1 Measures before repair

Before starting repair work, carry out the following steps:

▶ Disconnect the voltage supply to the unit externally.
▶ Wait 5 minutes until all components are de-energised and ensure they are de-energised.
▶ Ensure that the unit remains earthed.
▶ Do not damage the refrigeration circuit.
▶ Before and during operation of the unit, check the working environment and the interior of the unit for the presence of R290 using a refrigerant detector.
▶ For repair work where a release of refrigerant is to be expected, use mobile ventilation (e.g. explosion-protected fan).
▶ Before starting work on the relevant component, check the respective paint sealant for its original condition.
▶ Paint sealants that are removed for the purpose of repair must be reapplied afterwards.
▶ During soldering and welding work, a suitable fire extinguisher must be within the immediate vicinity.
▶ If refrigerant is being topped up, a CO_2 or powder extinguisher must be within the immediate vicinity.

7.1.2 Repair

- ▶ Perform any necessary repairs to the heat pump.
- ▶ Use a Schrader valve quick-release tool to prevent excessive refrigerant leakage when connecting and disconnecting hoses from the refrigeration circuit.

7.1.3 Measures after the repair

- ▶ Check that the wiring is not exposed to any wear, corrosion, tension, vibration, sharp edges or other adverse environmental influences. When checking, also take the effects of ageing into account.
- ▶ When replacing the high-pressure switch, ensure correct operation by means of a nitrogen leakage test.

7.2 Repairs to the refrigerant circuit

NOTICE

Property damage caused by freezing!

Property damage caused by freezing may occur when draining and refilling the refrigerant.

- ▶ Ensure a continuous flow through the condenser or, alternatively, drain the heating water from the unit.

7.2.1 Drawing-off refrigerant

Measures before draw-off

The refrigerant must be drawn-off using suitable equipment and collected in approved recycling cylinders. Personnel must be trained in the handling of recycling cylinders for R290. Recycling cylinders must be handled and returned/disposed of in accordance with safety regulations; observe the instructions provided by the recycling system operators.

Drawing-off

- ▶ Start draining the refrigerant at the service valve on the low-pressure side.
- ▶ After a few minutes, move the expansion valve to the open position using a permanent magnet.
- ▶ Open the service valve on the high-pressure side.
- ▶ Once the system has been drained/evacuated, flush the entire unit thoroughly with nitrogen.
- ▶ Evacuate to 20 mbar absolute pressure. Use vacuum pumps suitable for R290. Position the fan (Ex Zone II) so that the vacuum pump is in the air flow.
- ▶ Break the vacuum with nitrogen.
- ▶ If there is still refrigerant in the refrigeration circuit, repeat the "flushing" and "evacuation" steps. Check all service valves in the refrigeration circuit.

Repairs to the refrigerant circuit

- ▶ Always open the refrigeration circuit using a pipe cutter; do not unsolder any components.
- ▶ Flush with sufficient nitrogen during soldering work.
- ▶ Replace the filter drier whenever carrying out repair work on an open refrigeration circuit.
  Components that have been removed may release small quantities of refrigerant via residual compressor oil (particularly the compressor itself).

Do not seal or solder removed components.

- ▶ Store components outdoors until work is completed.
- ▶ Subsequent transport must take place in a ventilated vehicle.

7.2.2 Refrigerant charging

Measures before charging:

- Carry out the following checks before charging with refrigerant:
  - Pressure test on soldered joints
  - Leakage test
  - Evacuate to an absolute pressure of 2.7 mbar or lower
- The leak detector must be suitable for the refrigerant used.
- Ensure that the refrigerant circuit is grounded.
- Evacuate the filling hose and pressure gauge assembly up to the connection point on the unit before filling. Once the pressure gauge assembly and the charging hose have been filled with propane, check them again for leaks.

Do not use filling fittings for different refrigerants. Choose hoses that are as short as possible to minimise the amount of refrigerant contained.

Filling

- ▶ During filling, ensure that heating water is being pumped through the condenser or, alternatively, that the heating water has been drained from the unit.
- ▶ Position refrigerant cylinders vertically.
- ▶ Ventilate the refrigerant cylinder and hoses externally using a fan (Ex Zone II).
- ▶ Do not heat the refrigerant cylinder with open flames or a hot-air gun. Possible aids to speed up filling include, for example, a warm water bath or heating sleeves suitable for propane cylinders.
- ▶ After filling, safely release the remaining propane from the pressure gauge assembly and the hoses.
- ▶ After filling, check for leaks again using a refrigerant leak detector. If a leak is detected, repeat the process.

7.3 Refrigerant gas sensor replacement

The heat pump contains a refrigerant gas sensor which must be replaced after 15 years of operation. The sensor must be replaced by a Bosch service partner.

Within due time of the service interval expiring, the system operator is notified of the necessary replacement via alerts in the heat pump manager. From 14 years of operation onwards, the service interval is indicated by recurring reminders at increasingly shorter intervals, accompanied by a fault shutdown of the heat pump.

The system operator can acknowledge these faults via the heat pump manager. In this case, the heat pump continues to operate as normal until the next reminder.

The reminders/fault shutdowns appear after the following operating periods
14 years + 0 weeks (first reminder)
14 years + 16 weeks
14 years + 32 weeks
14 years + 40 weeks
14 years + 44 weeks
14 years + 46 weeks
14 years + 48 weeks
14 years + 49 weeks
14 years + 50 weeks
14 years + 51 weeks
14 years + 52 weeks (last reminder)

After the final reminder, the heat pump manager prevents the heat pump from continuing to operate! Normal operation of the heat pump is no longer possible without the sensor being replaced by a Bosch service partner. Frost protection mode remains available.
After replacing the sensor, the service interval starts from the beginning and the reminders follow the sequence shown.
When the refrigerant gas sensor is replaced by a qualified service technician, the solenoid valve (Y19), the anti-freeze valves (HC6), the micro-bubble separator (HC5) and the non-return valve (HC4) require maintenance.

7.4 Refrigerant gas sensor self-calibration

The refrigerant gas sensor features automatic self-calibration. In rare cases, this may lead to a preventive fault shutdown. This fault can be acknowledged on the heat pump manager. In very rare cases, particularly under extreme environmental conditions, a failed automatic self-calibration will cause the heat pump to shut down. In this case, frost protection is no longer guaranteed. The refrigerant gas sensor must be replaced by a Bosch service partner.

NOTICE

Property damage caused by freezing!

If the system is shut down due to a failed self-calibration of the refrigerant gas sensor during a frost period, there is a risk of freezing.

- ▶ Have the refrigerant gas sensor replaced by a Bosch service partner as soon as possible

8 Decommissioning

Removal of the heat pump must be carried out by a specialist.

Anyone carrying out work on the refrigeration circuit must hold a certificate of competence in handling flammable refrigerants, or must be supervised by such a person.

DANGER

Risk of lightning strike!

- ▶ Do not remain in the immediate vicinity of the heat pump during a thunderstorm.

DANGER

Risk to life due to electric shock!

When working on electrical equipment or live components in wet weather (rain, snow, etc.), there is a danger to life.

- ▶ In the event of rain, snow, etc., ensure that the heat pump housing is kept properly closed.

DANGER

Risk to life due to electric shock!

There is a risk of electric shock if all casing panels are not mounted on the unit.

- ▶ Disconnect all circuits from the power supply before opening the unit.
- ▶ Wait 5 minutes until all components are de-energised and ensure they are de-energised.

To decommission the heat pump, carry out the following steps:

- Familiarise yourself with the device-specific and local conditions.
- Switch off the external power supply to the heat pump.
- Shut off the heat pump hydraulically.
- When disposing of the entire heat pump or parts of the refrigeration circuit, in particular the compressor, leave these parts open after removing the refrigerant → Chapter 7.2 page 34.
- Do not seal components by crimping or soldering.
- To dispose of the compressor, evacuate it to a sufficient negative pressure to remove as much of the dissolved refrigerant in the compressor oil as possible → Chapter 7.2.1 page 34.
- Mark the heat pump accordingly to indicate that it has been decommissioned and the refrigerant removed. Provide the identification with date and signature.

9 Environment/disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.
The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.
We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.
All of our packaging materials are environmentally compatible and can be recycled.

Used appliances

Used appliances contain valuable materials that can be recycled.
The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

Old electrical and electronic devices

This symbol means that the product cannot be disposed of with other waste, but must be taken to waste collection points for treatment, collection, recycling and disposal.

The symbol is valid for countries that have directives on electronic waste, e.g. "European Union Directive 2012/19/EC on end-of-life electrical and electronic appliances". These provisions define the regulatory framework of the directive valid for the return and recycling of used electronic appliances in each country.

Electronic appliances that may contain hazardous substances must be recycled responsibly in order to minimise possible damage to the environment and dangers to people's health. To this end, the recycling of electronic waste contributes to the preservation of natural resources.

For more information on the environmentally safe disposal of used electrical and electronic appliances, please contact the local authorities, waste disposal company or distributor from which you purchased the product.

You can find more information here:
www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/

10 Data Protection Notice

We, **Bosch Thermotechnology Ltd., Cotswold Way, Warndon, Worcester WR4 9SW, United Kingdom**, process product and installation information, technical and connection data, communication data, product registration and client history data to provide product functionality (art. 6 §1.1 (b) GDPR), to fulfil our duty of product surveillance and for product safety and security reasons (art. 6 §1.1 (f) GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 §1.1 (f) GDPR) and to analyse the distribution of our products and to provide individualized information and offers related to the product (art. 6 §1.1 (f) GDPR). To provide services such as sales and marketing, contract management, payment management, programming, data hosting and hotline services, we may request and transfer data to external service providers and/or Bosch affiliates. In some cases, but only if adequate data protection is ensured, personal data may be transferred to recipients located outside the European Economic Area. Additional information is provided upon request. You can contact our Data Protection Officer under: Data Protection Officer for Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object to the processing of your personal data at any time on the basis of Art. 6 §1.1 (f) GDPR on grounds relating to your particular situation or if your data is used for direct marketing purposes. To exercise your rights, please contact us at **privacy.ttpo@bosch.com.** For more information, follow the QR code.

11 Technical specifications and reports

11.1 Technical data

		Unit	Value
Design			
Heat source		–	Air
Seasonal space heating energy efficiency for an average climate 35 °C/ 55 °C[1)]		%	205/155
Seasonal Coefficient of Performance (SCOP) for an average climate 35 °C/55 °C[1)]		–	5.20/3.96
Seasonal Coefficient of Performance (SEER) for fan-assisted convector heater/cooling ceiling[1)]		–	3.94/4.77
Flow temperature when cooling via cooling ceiling		°C	18
Flow temperature when cooling via fan-assisted convector heaters		°C	7
Control		–	WPM connect
Heat metering		–	Integrated
Installation location		–	Outdoors
Output stages		–	Inverter
Operating limits			
Heating water flow/return		°C	up to +70/from +18
Cooling water flow		°C	+7 ... +20
Air (heating)		°C	-22 ... +40
Air (cooling)		°C	+10 ...+45
Operating humidity		%rF	0 ... 100
Permissible ambient temperature (operation in standby mode)		°C	-30 ... 50
Installation altitude above sea level		metres above sea level	2000
Flow rate			
Heating water flow/internal pressure difference			
Nominal flow rate according to EN 14511	A7/W35...30	$m^3/h/Pa$	2.0/20000
Minimum heating water flow		m^3/h	2.0
Heating water flow for dimensioning the pump		$m^3/h/Pa$	2.5/31000
Maximum heating/cooling water flow		m^3/h	3.0
Minimum cooling water flow/internal pressure difference		$m^3/h/Pa$	2.0/20000
Air flow rate	Normal Operation	m^3/h	4600...9500
Sound			
Sound power level according to EN 12102	A7/W55 ErP according to EN 12102	dB(A)	52 (7.4 kW)
Sound pressure level in 10 m distance, free-standing installation[2)]	A7/W55 ErP according to EN 12102	dB(A)	24 (7.4 kW)
max. sound power – Day [3)]	A-7/W55	dB(A)	66.7 (21.7 kW)
max. sound power – silent operation[3)]	A-7/W55	dB(A)	57.5 (9.6 kW)

		Unit	Value
Sound power level	A2/W4x-42 EN 14825 (Average M, operating point B)	dB(A)	52 (9.9 kW)
Sound power level	A-4/W49	dB(A)	59 (15.8 kW)
Tonality surcharge – Day		dB(A)	3
Tonality surcharge – Night		dB(A)	3
Dimensions, weight, fill volumes			
Unit dimensions without connections	H × W × L	mm	1517 × 1800 × 885
Unit connections for heating		inch	R 1 ¼" thread seal (outside thread)
Weight of the unit excl. packaging		kg	400
Refrigerant/Total filling weight		Type/kg	R290/2.5
GWP value/CO_2 equivalent		– /t	3/0.01
Refrigerant circuit hermetically sealed		–	Yes
Lubricant/Total fill volume		Type/l	PZ46M/1.15
Electric connection			
Load voltage		–	3~/PE 400 V (50 Hz)
Fuse protection		–	C25
Type of RCD		–	B
Short-circuit power ratio Rsce		–	≥ 350
Short-circuit power Ssc		kVA	4616
Control voltage/		–	1~/N/PE 230 V (50 Hz)
fuse protection via WPM		–	6.3 AT
IP rating according to EN 60529		–	IP 24
Starting current		–	< I_B
Phase monitoring		–	Yes
max. capacity/cos φ		kW/ –	12.5/0.99
max. operating current/I_B		A	22.3
Oil sump heater power input (regulated)		W	70
Fan power input		W	< 700
Power input at A2/W35	min/max.	kW	1.45/4.66
Other design features			
Defrost method			Circuit reverse
Frost protection condensation catch pan/water in the unit protected against freezing[4)]			Yes
Permissible operating pressure (heat sink)		bar	1.0 ...4.5
Pressure relief valve excess pressure (heat sink)		bar	5.4
Output			
Heat output/Coefficient of Performance[1)5)]			EN 14511
		Output stage	modulating
	A-10/W35 max.	kW/ –	19.8/2.8
	A-10/W55 max.	kW/ –	19.7/2.0
	A-7/W35 min.	kW/ –	8.8/3.6
	A-7/W35 max.	kW/ –	19.6/2.8
	A2/W35 min.	kW/ –	6.8/4.7
	A2/W35 max.	kW/ –	17.4/3.7
	A7/W35 min.	kW/ –	7.7/5.5
	A7/W35 nominal point	kW/ –	11.6/5.4
	A7/W35 max.	kW/ –	19.0/5.0
	A7/W55 nominal point & max.	kW/ –	17.4/3.2
Cooling capacity/Coefficient of Performance[1)5)]			EN 14511
	A35/W18 min.	kW/ –	11.3/4.5
	A35/W18 max.	kW/ –	17.6/3.7
	A27/W18 min.	kW/ –	11.4/5.8
	A27/W18 max.	kW/ –	18.4/4.6
	A35/W7 min.	kW/ –	8.4/3.4

		Unit	Value
	A35/W7 max.	kW/ –	13.0/2.9
	A27/W7 min.	kW/ –	8.4/4.2
	A27/W7 max.	kW/ –	13.4/3.5
Transport and storage			
Storage humidity (non-condensing)		% rF	0 ... 100
Storage temperature		°C	-20 ... 50
Transport temperature		°C	-20 ... 50

1) During the first 72 hours of operation following initial commissioning, the performance and efficiency of the pump may differ from the specified values.
2) Calculated for an open-field installation. The installation-specific sound pressure level can be calculated at www.waermepumpe.de/werkzeuge/schallrechner for different installation configurations.
3) The sound power level can be used to calculate the emission guideline value in accordance with TA-Lärm for the "Average" climate region in an average temperature application
4) The heat pump and controller of the heat pump, refrigerant gas sensor, must always be operational.
5) The performance and efficiency of the heat pump may differ from the specified values if the M16 pump is not controlled via the control signal from the heat pump manager.

Table 15 Technical data

11.2 Heating curve

Heating water outlet 35 °C
Heating water flow 2.0 m³/h

Heating capacity

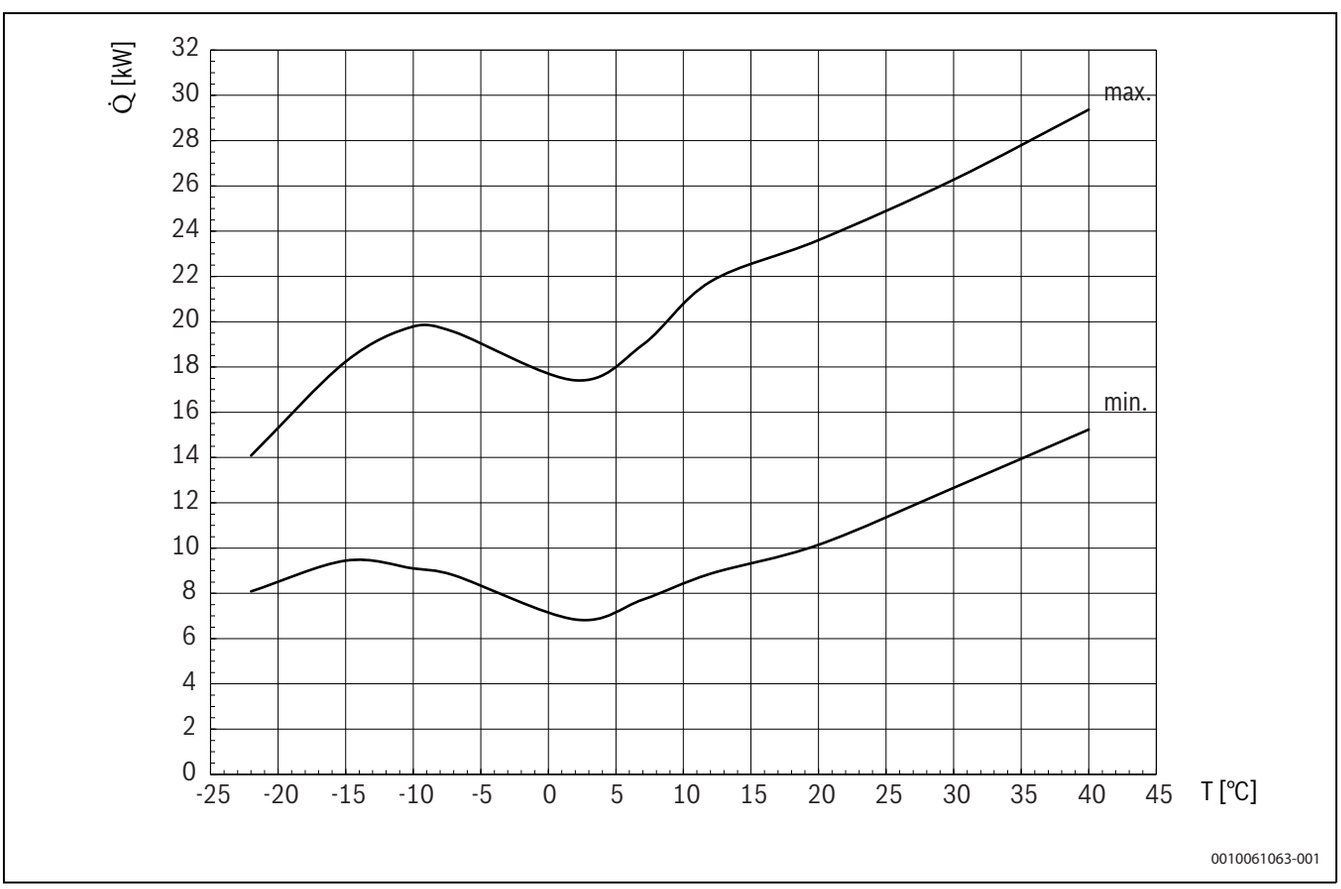

Fig. 64 Heating capacity

Q Heating capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

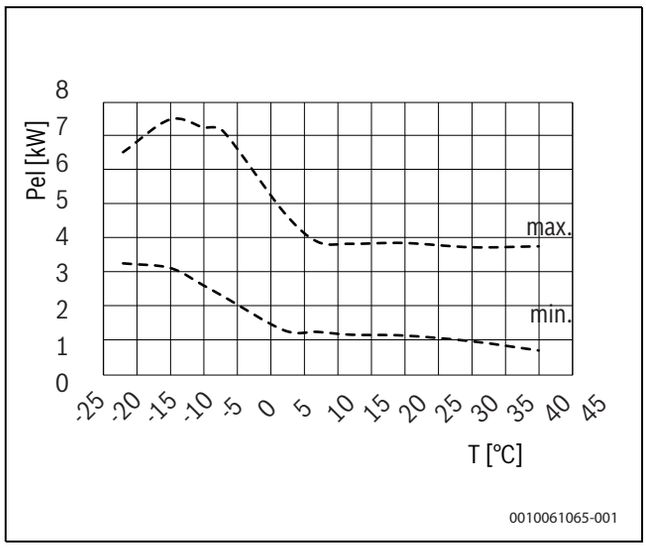

Fig. 65 Power consumption in kW

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

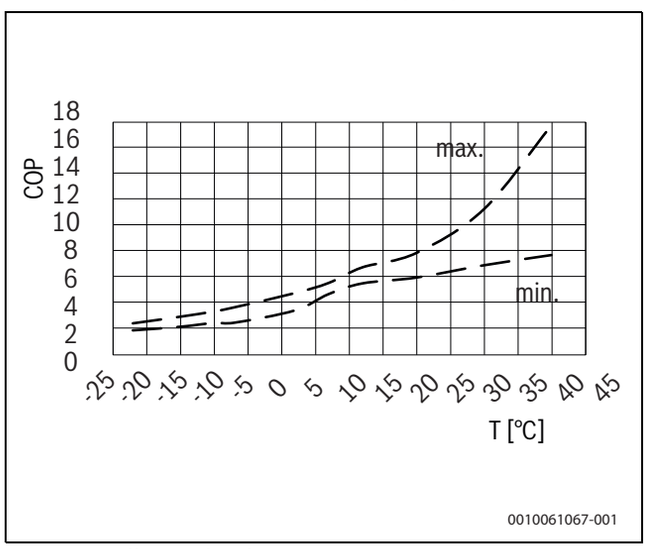

Fig. 66 Coefficient of Performance

COP Coefficient of performance
T Air inlet temperature R38

Pressure drop

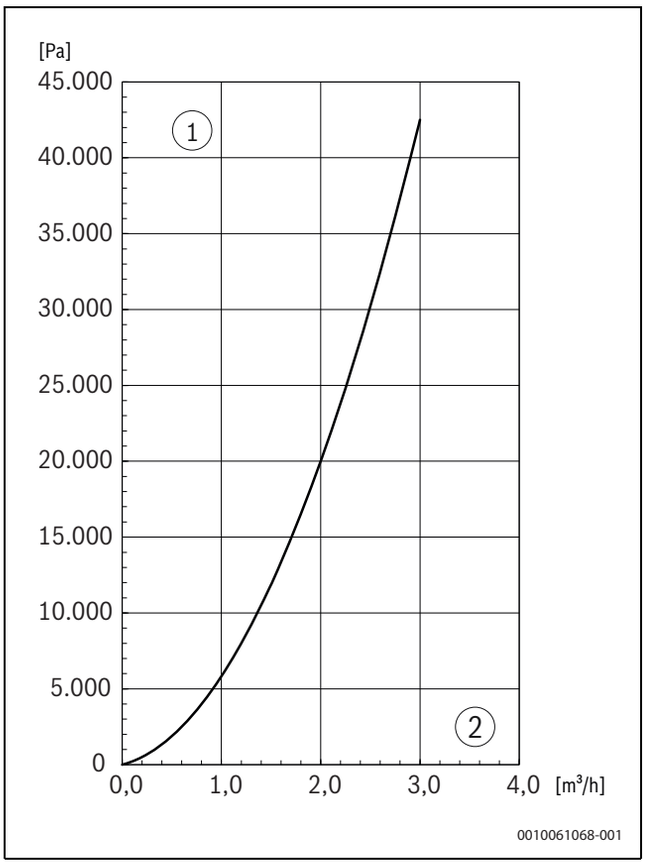

Fig. 67 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Heating water flow [m³/h]

Heating water outlet 45 °C
Heating water flow 2.0 m^3/h

Heating capacity

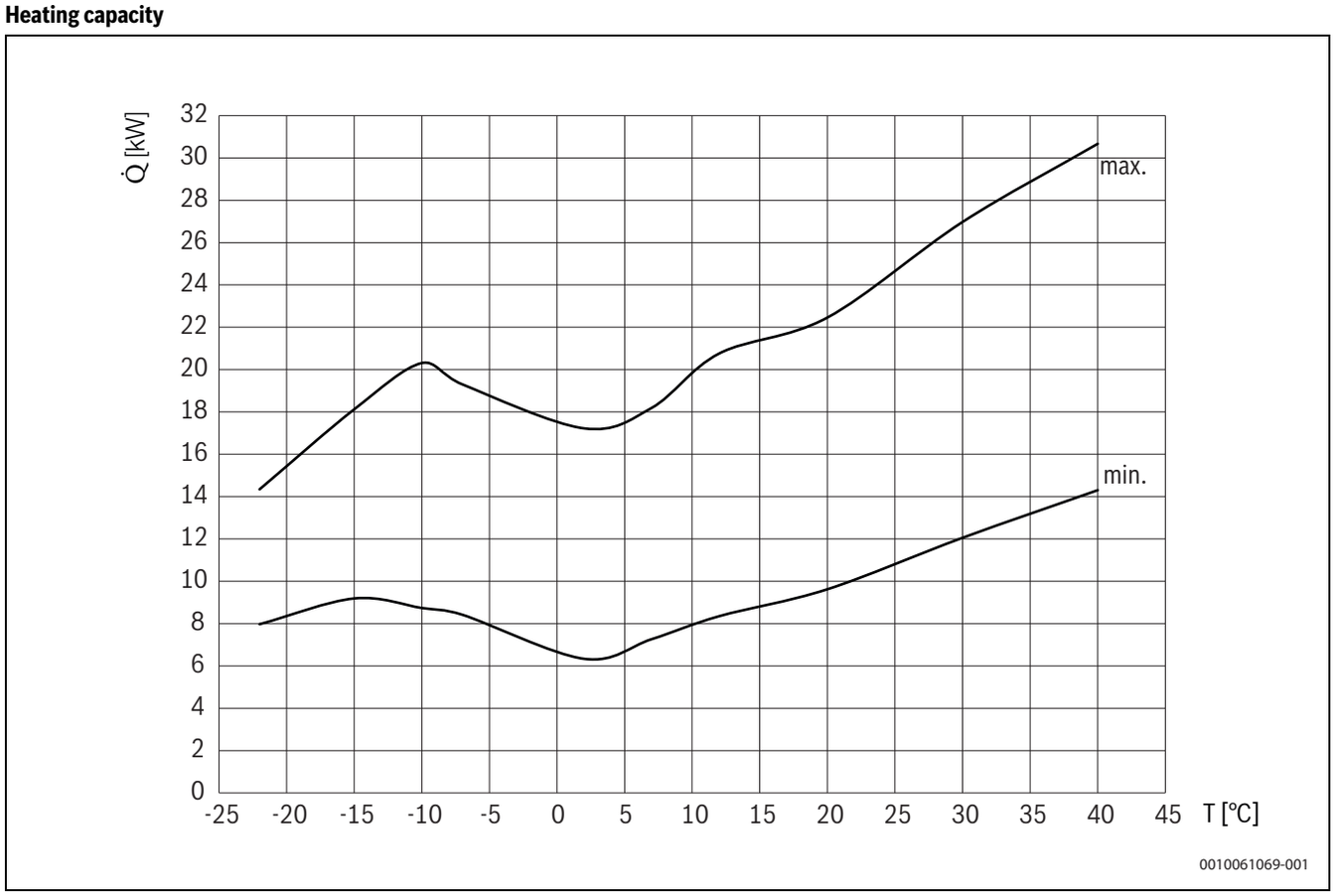

Fig. 68 Heating capacity

Q Heating capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

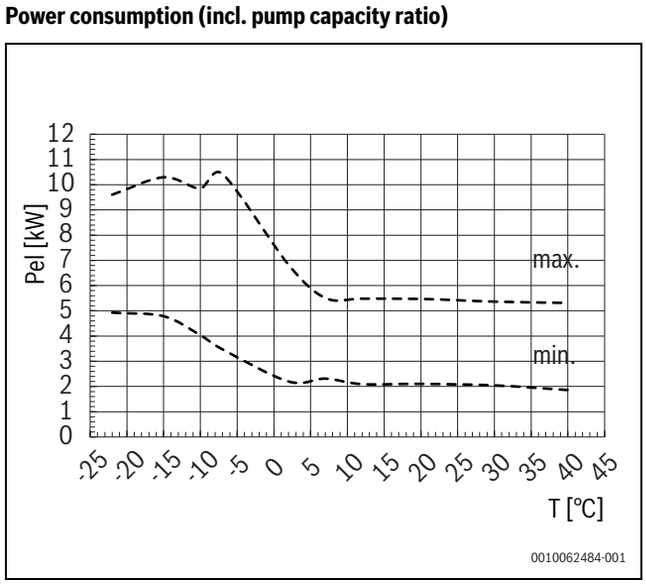

Fig. 69 Power consumption in kW

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

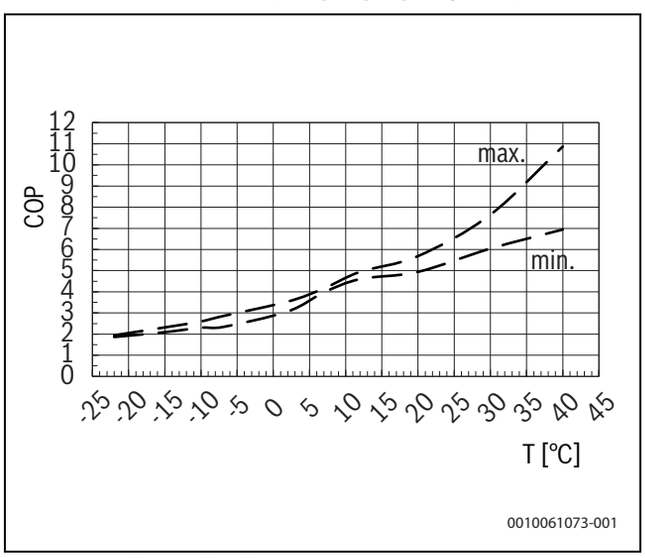

Fig. 70 Coefficient of Performance

COP Coefficient of performance
T Air inlet temperature R38

Pressure drop

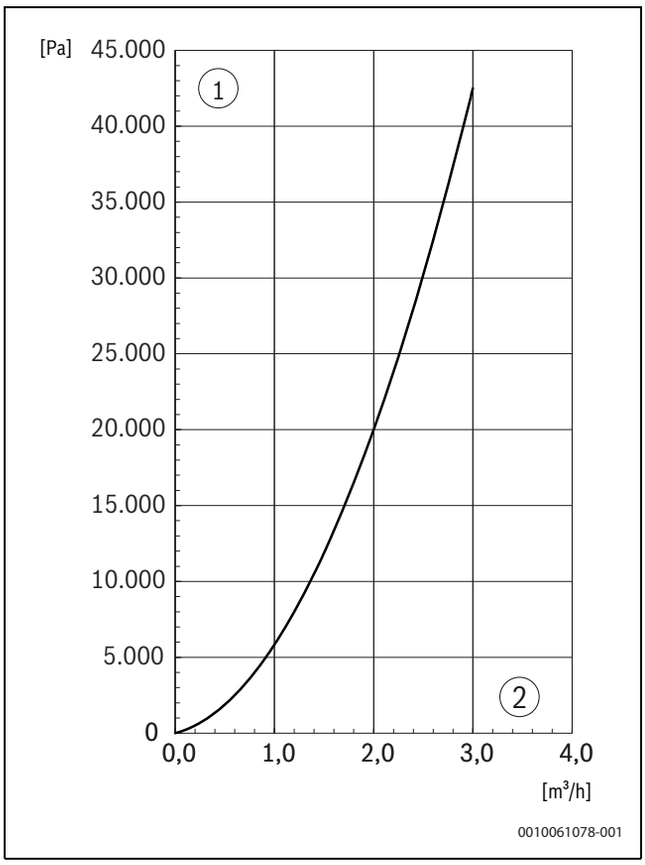

Fig. 71 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Heating water flow [m^3/h]

Heating water outlet 55 °C
Heating water flow 2.0 m^3/h

Heating capacity

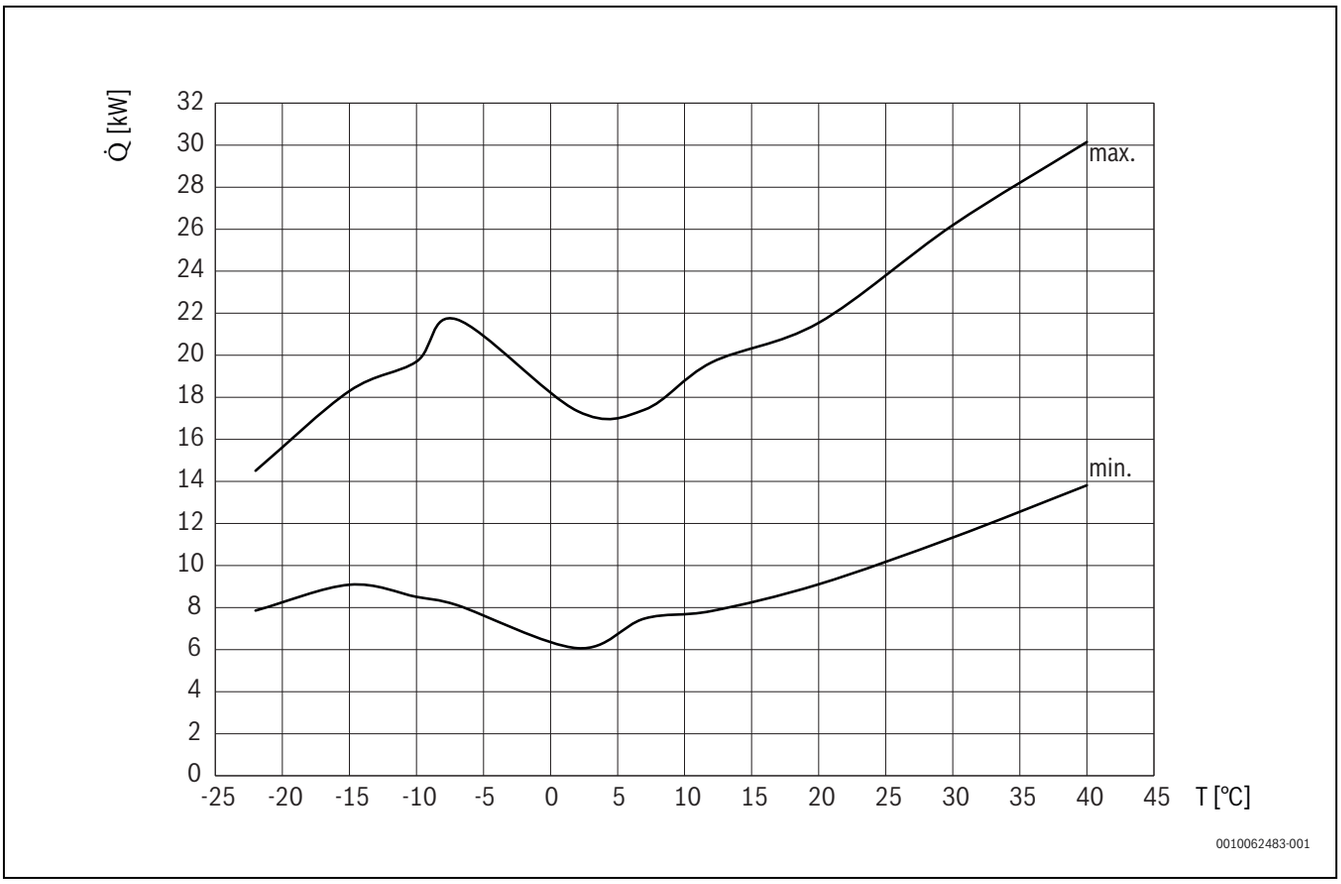

Fig. 72 Heating capacity curve

Q Heating capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

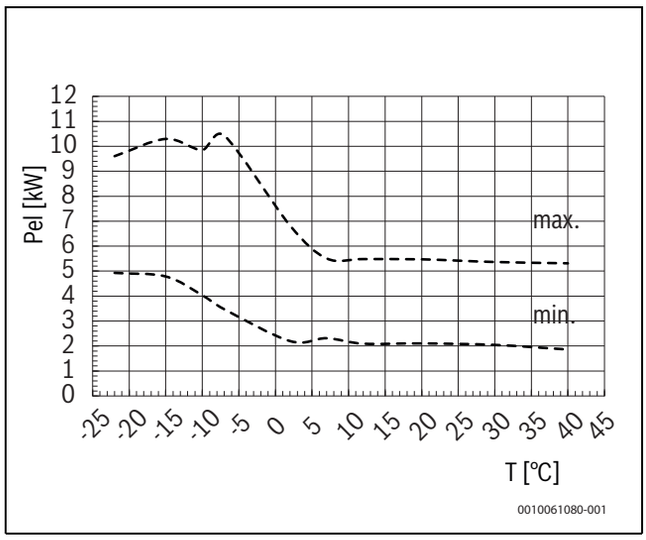

Fig. 73 Power consumption in kW

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

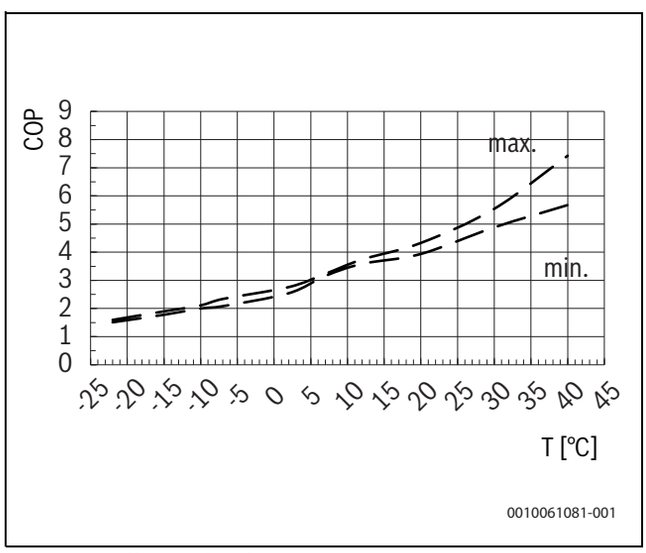

Fig. 74 Coefficient of Performance

COP Coefficient of performance
T Air inlet temperature R38

Pressure drop

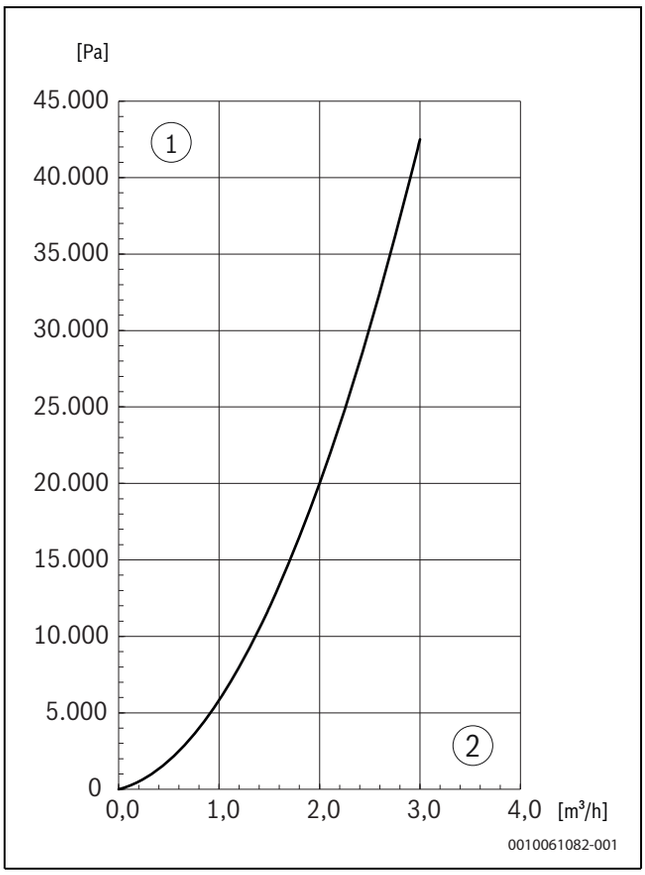

Fig. 75 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Heating water flow [m³/h]

Heating water outlet 65 °C
Heating water flow 2.0 m³/

Heating capacity

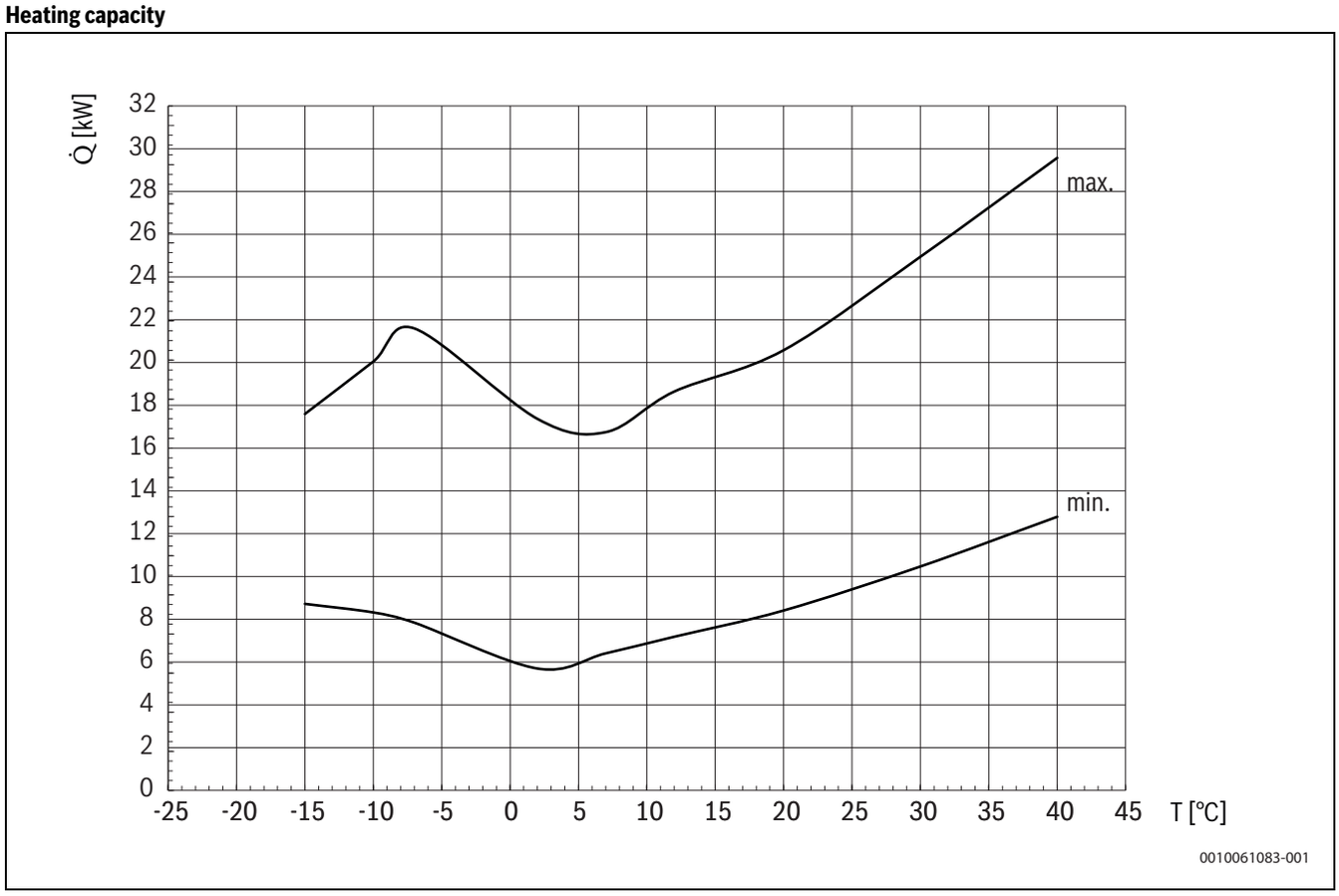

Fig. 76 Heating capacity curve

Q Heating capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

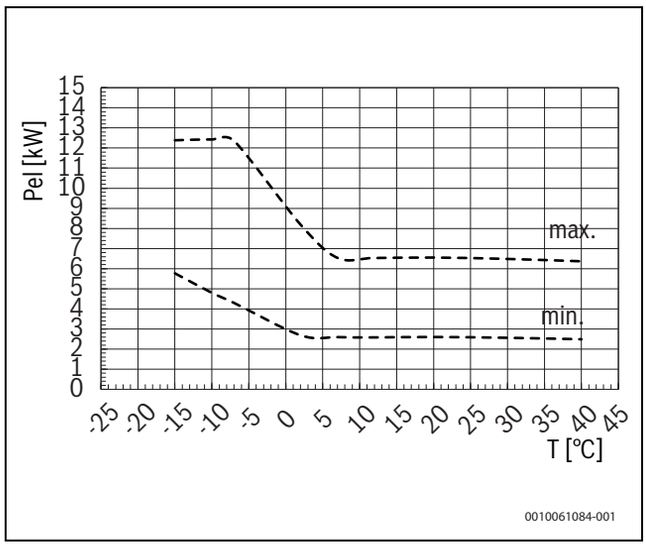

Fig. 77 Power consumption in kW

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

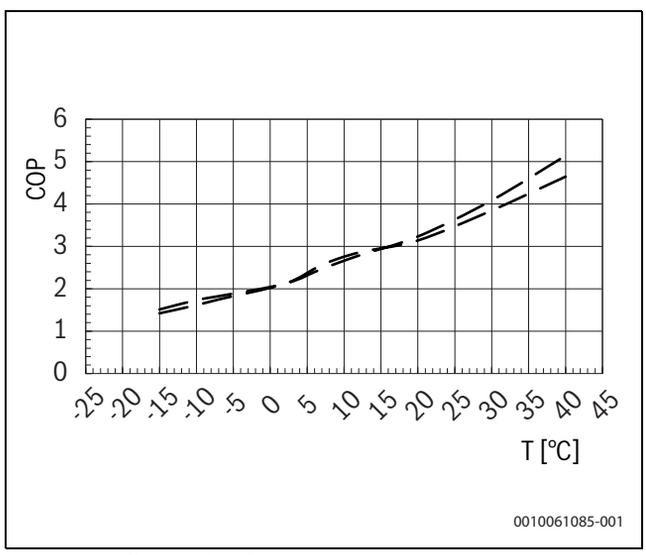

Fig. 78 Coefficient of Performance

COP Coefficient of performance
T Air inlet temperature R38

Pressure drop

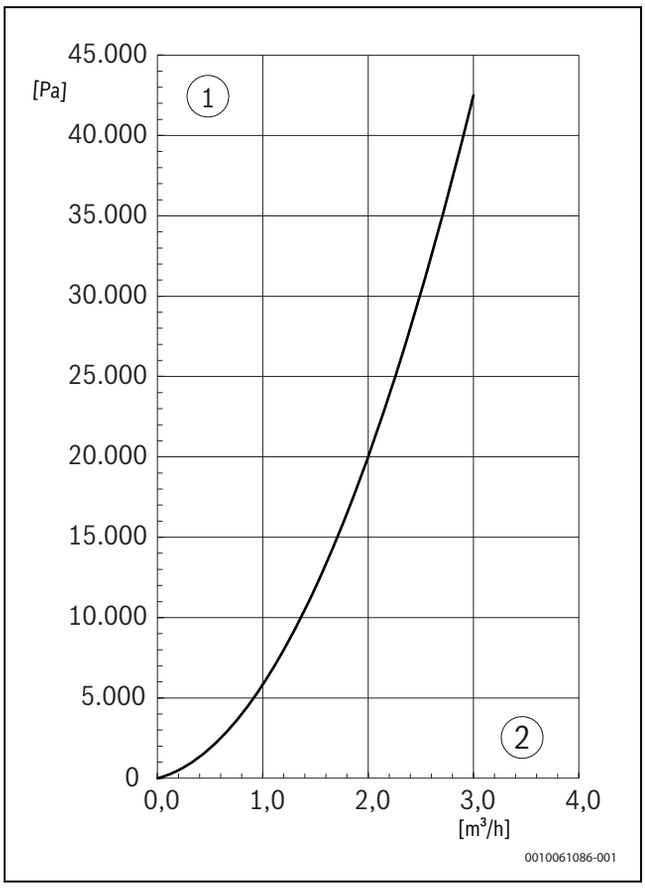

Fig. 79 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Heating water flow [m³/h]

11.3 Cooling curve

Cooling water outlet 7 °C
Cooling water flow 2.0 m³/h

Cooling capacity

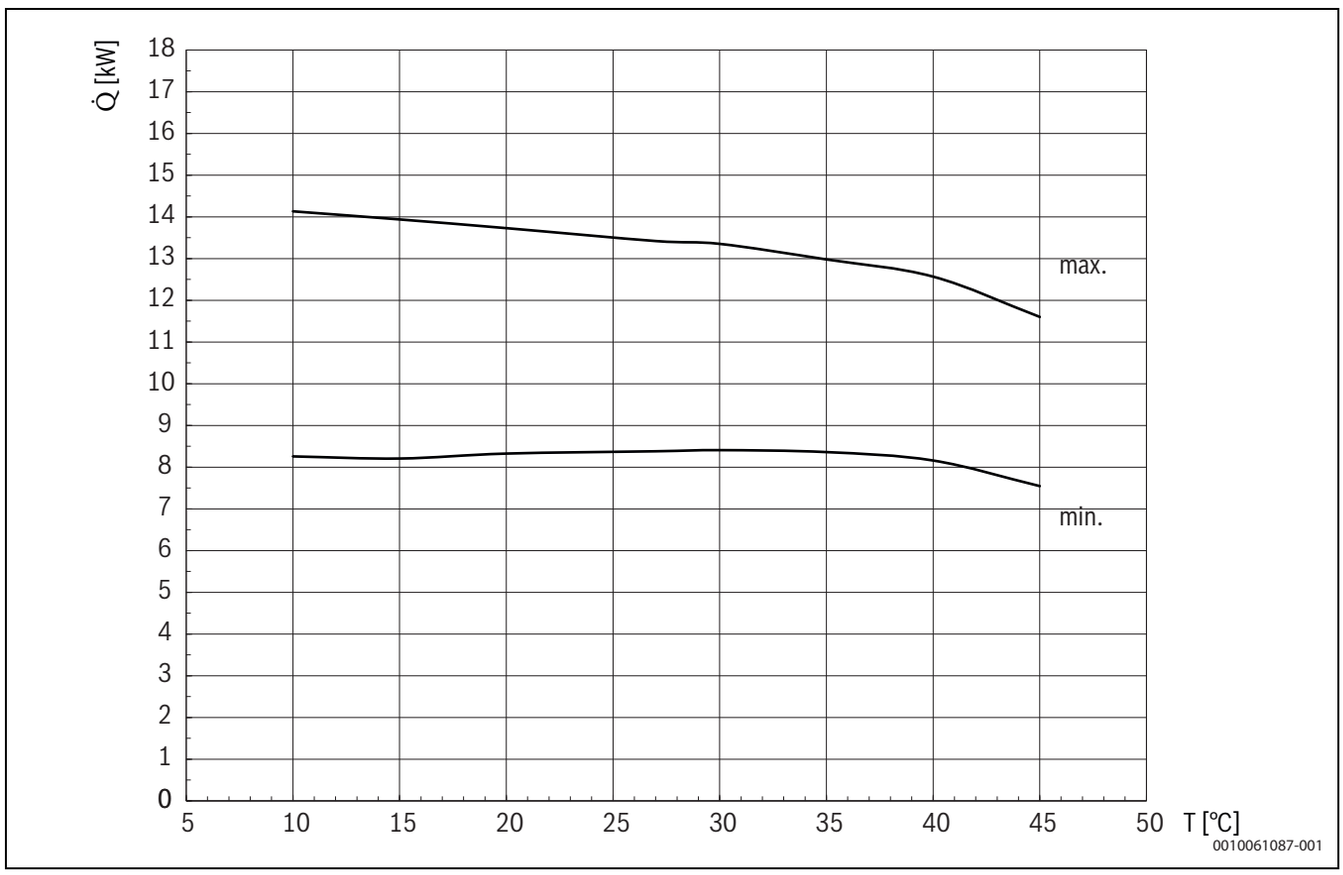

Fig. 80 Cooling capacity

Q Cooling capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

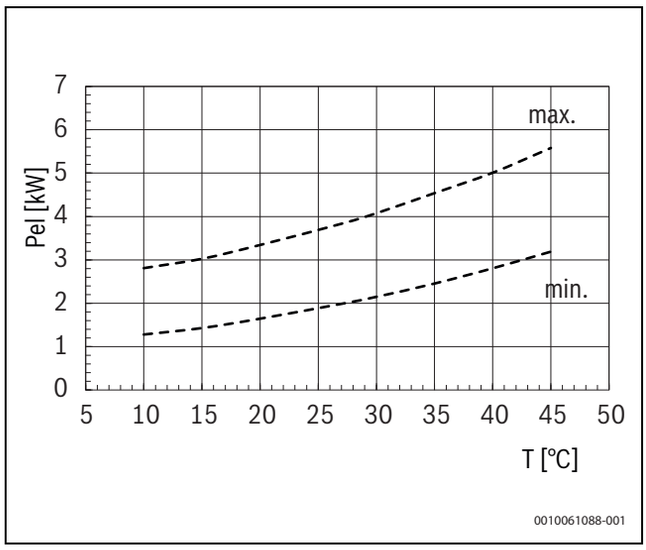

Fig. 81 Power consumption curve in kW

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

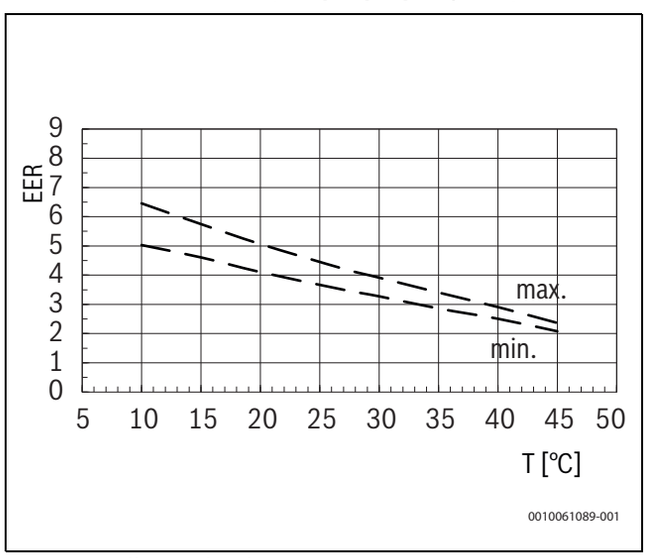

Fig. 82 Coefficient of Performance

EER Energy Efficiency Ratio
T Air inlet temperature R38

Pressure drop

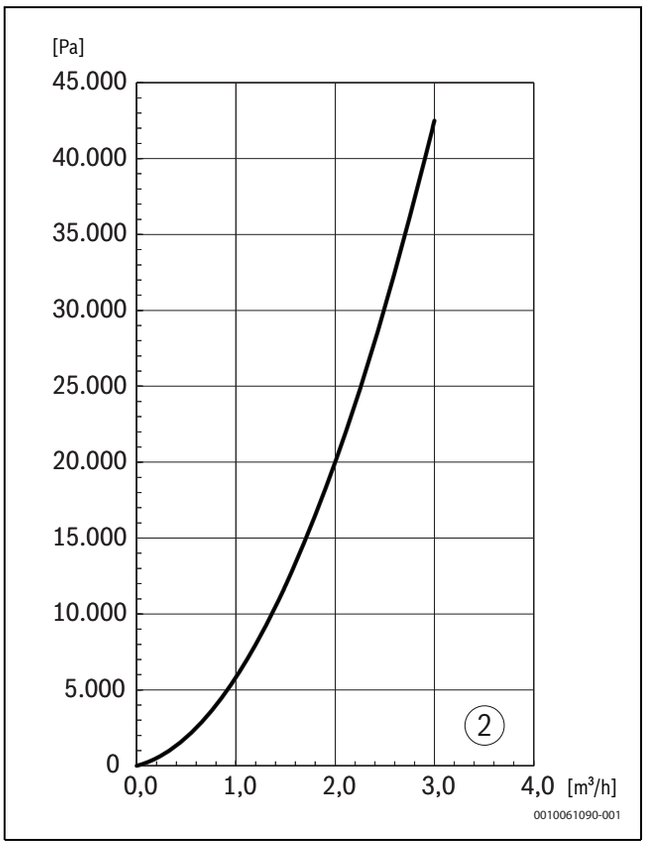

Fig. 83 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Cooling water flow [m³/h]

Cooling water outlet 18 °C
Cooling water flow 2.0 m^3/h

Cooling capacity

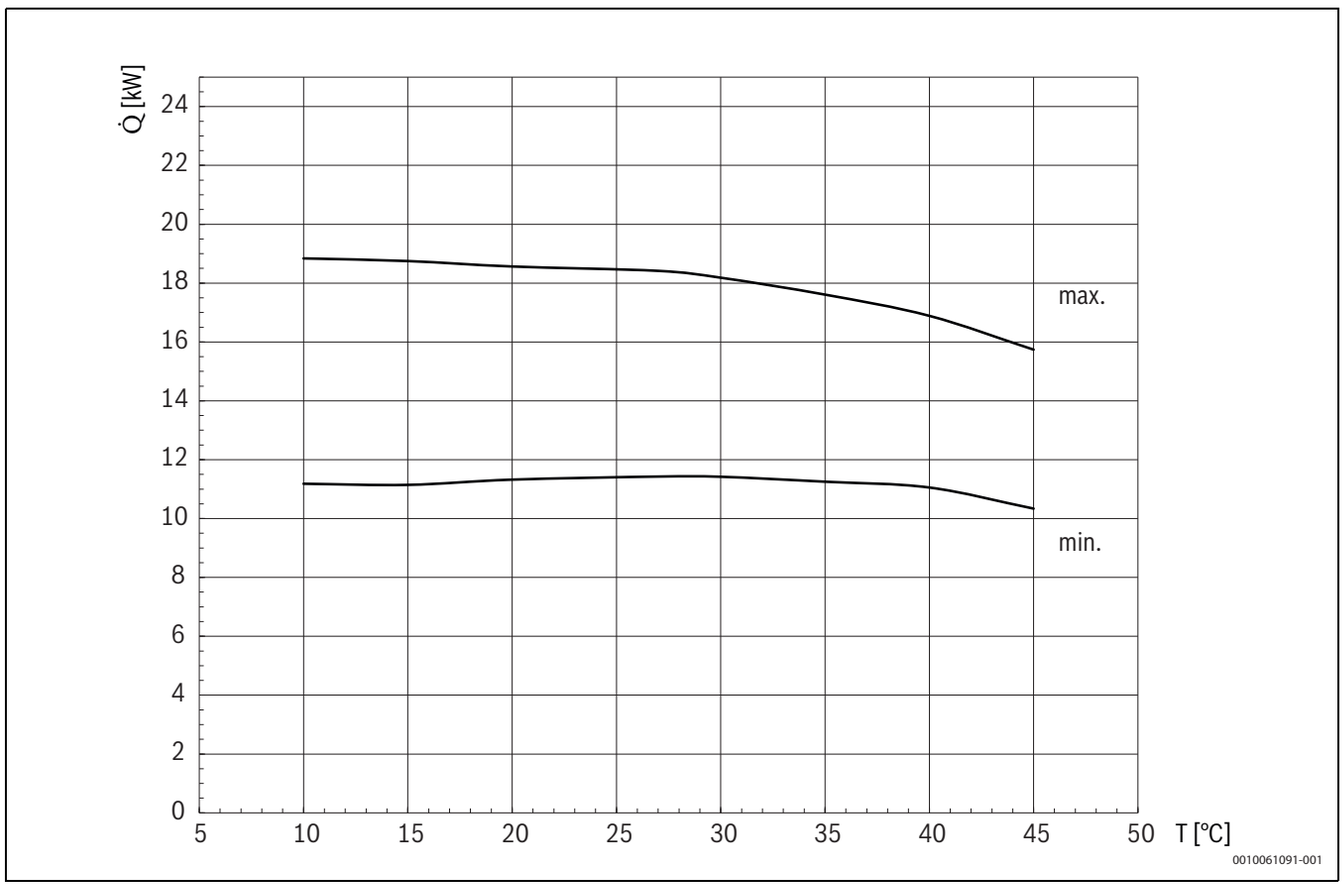

Fig. 84 Cooling capacity

Q Cooling capacity
T Air inlet temperature R38

Power consumption (incl. pump capacity ratio)

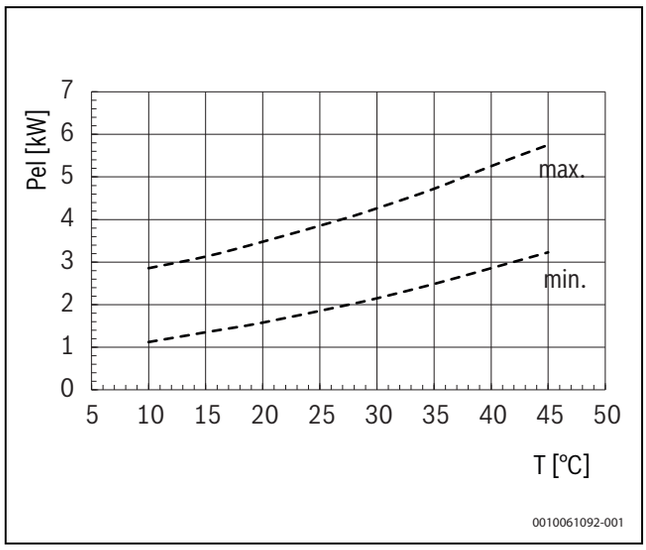

Fig. 85 Power consumption

Pel Power consumption
T Air inlet temperature R38

Coefficient of Performance (incl. pump capacity ratio)

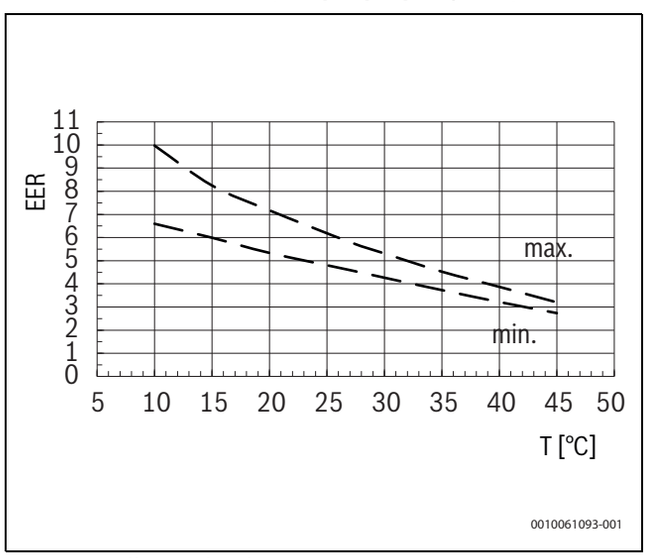

Fig. 86 Coefficient of Performance

EER Energy Efficiency Ratio
T Air inlet temperature R38

Pressure drop

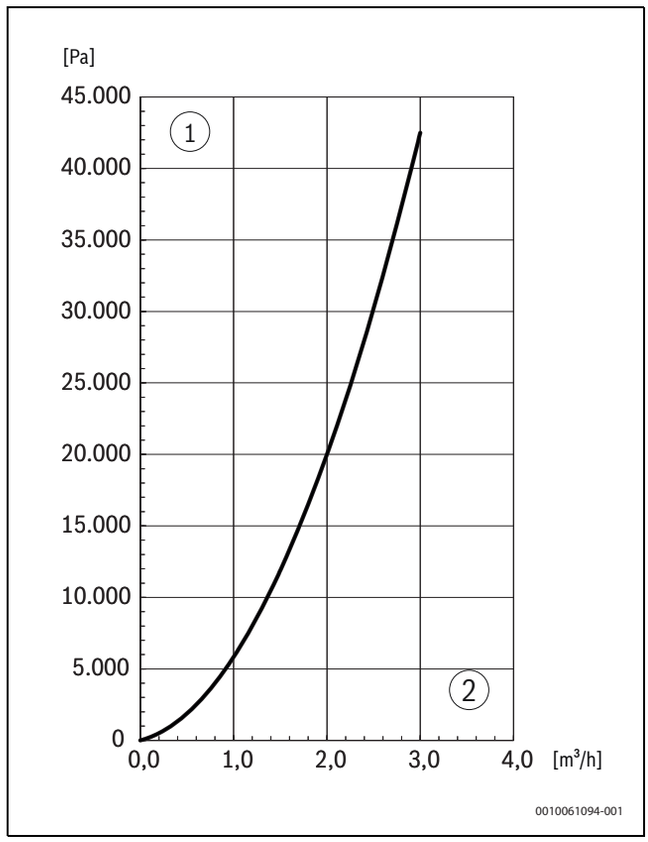

Fig. 87 Pressure drop via the plate heat exchanger

[1] Pressure drop [Pa]
[2] Cooling water flow [m³/h]

11.4 Heating operating limits

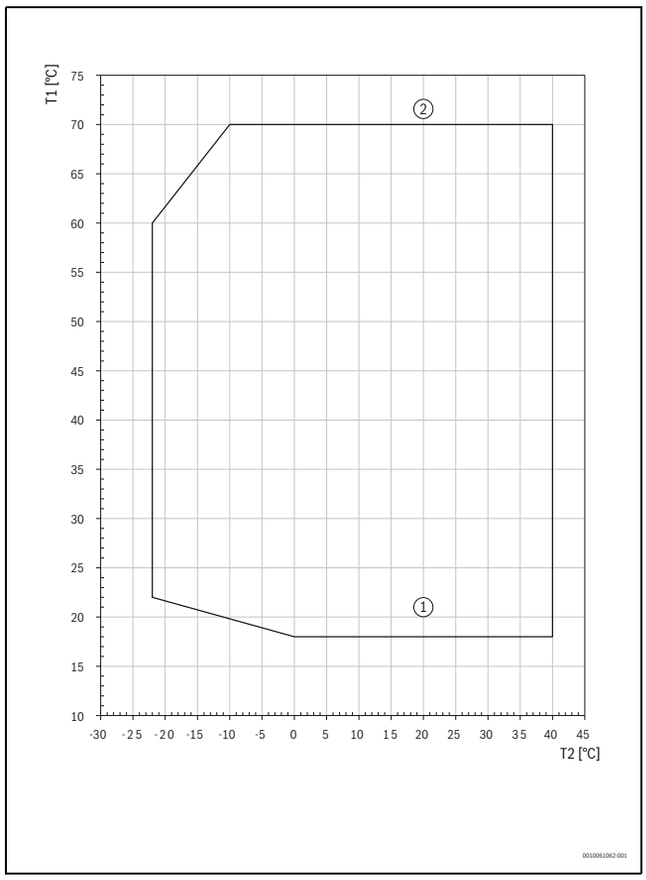

Fig. 88 Heating operating limits

T1 Heating water temperature R3.1
T2 Air inlet temperature R38

[1] Water ingress*
[2] Water outlet (+0/-2 K)

*For air-to-water heat pumps, the minimum heating water temperature represents the minimum return temperature.

11.5 Cooling operating limits

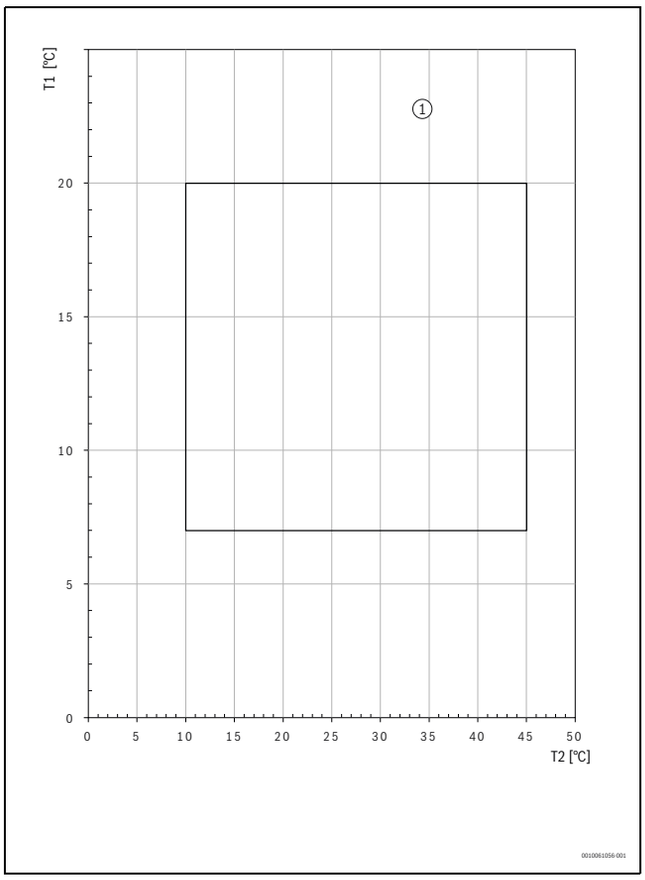

Fig. 89 Cooling operating limits

T1 Cooling water temperature R3.1
T2 Air inlet temperature R38

[1] Water outlet (+2/-0 K)

These figures apply provided that the required minimum cooling water flow rate is maintained.

11.6 Refrigerant plan

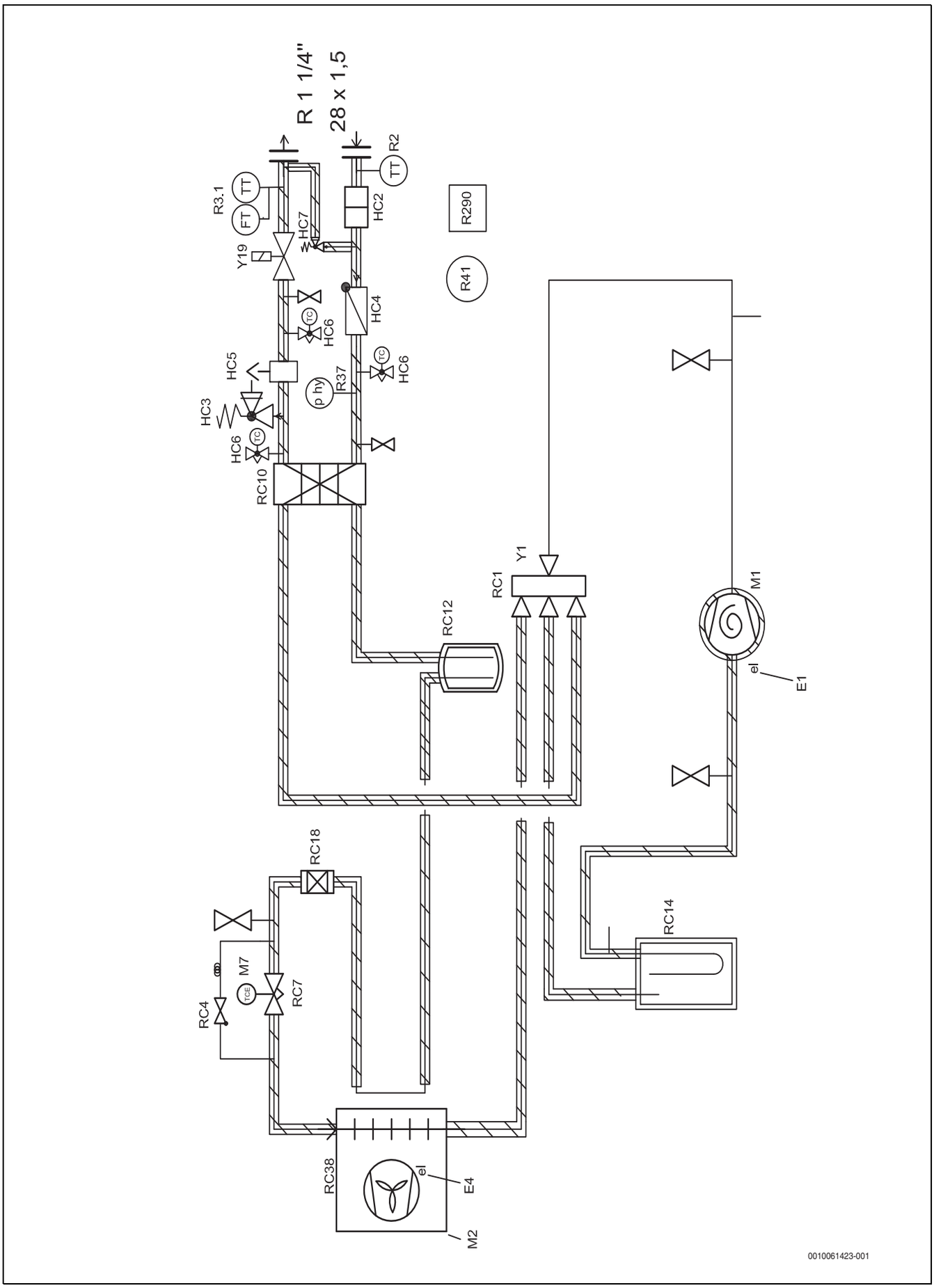

Fig. 90 Refrigerant plan

11.7 Hydraulic integration

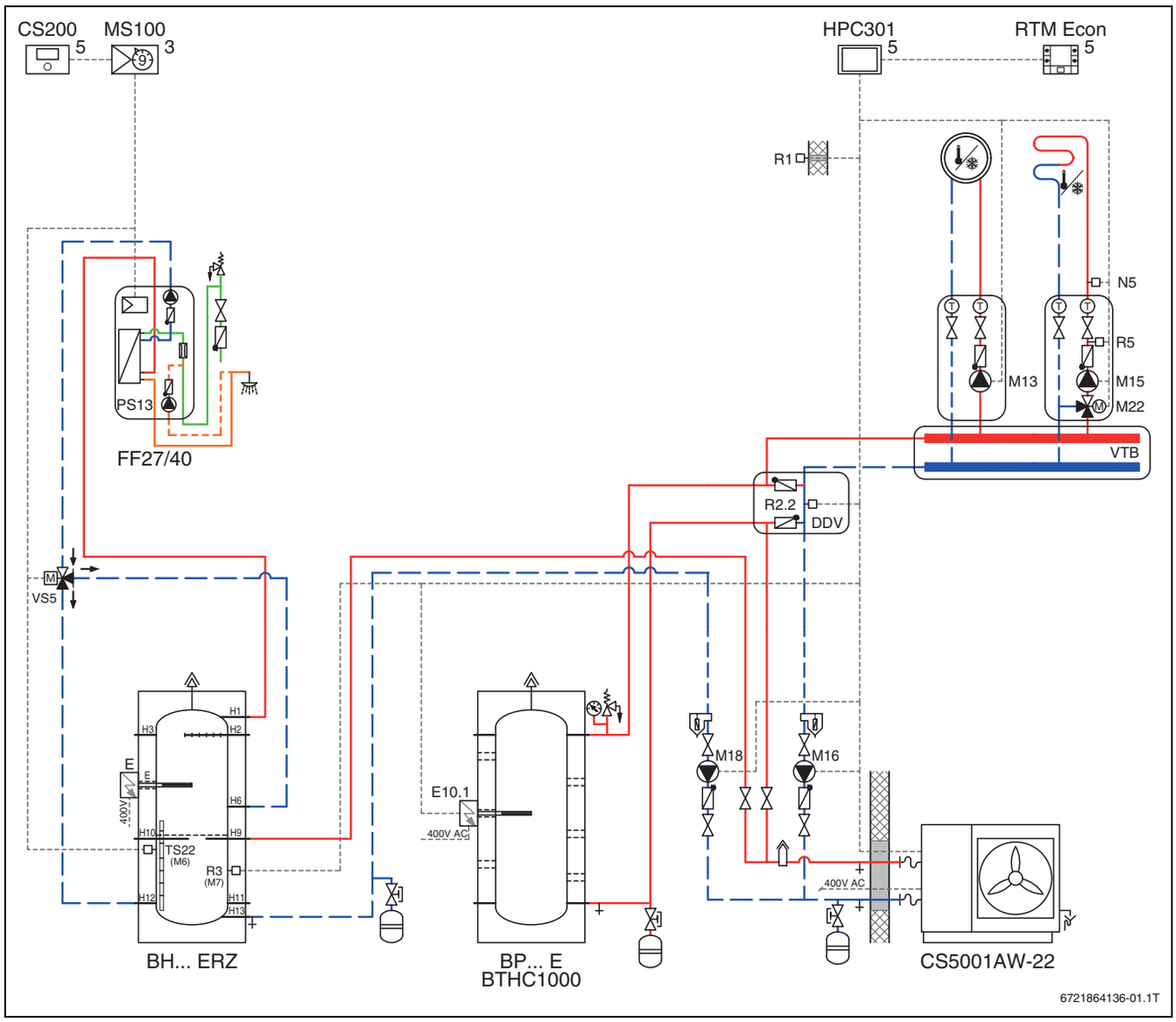

Fig. 91 Hydraulic connection diagram

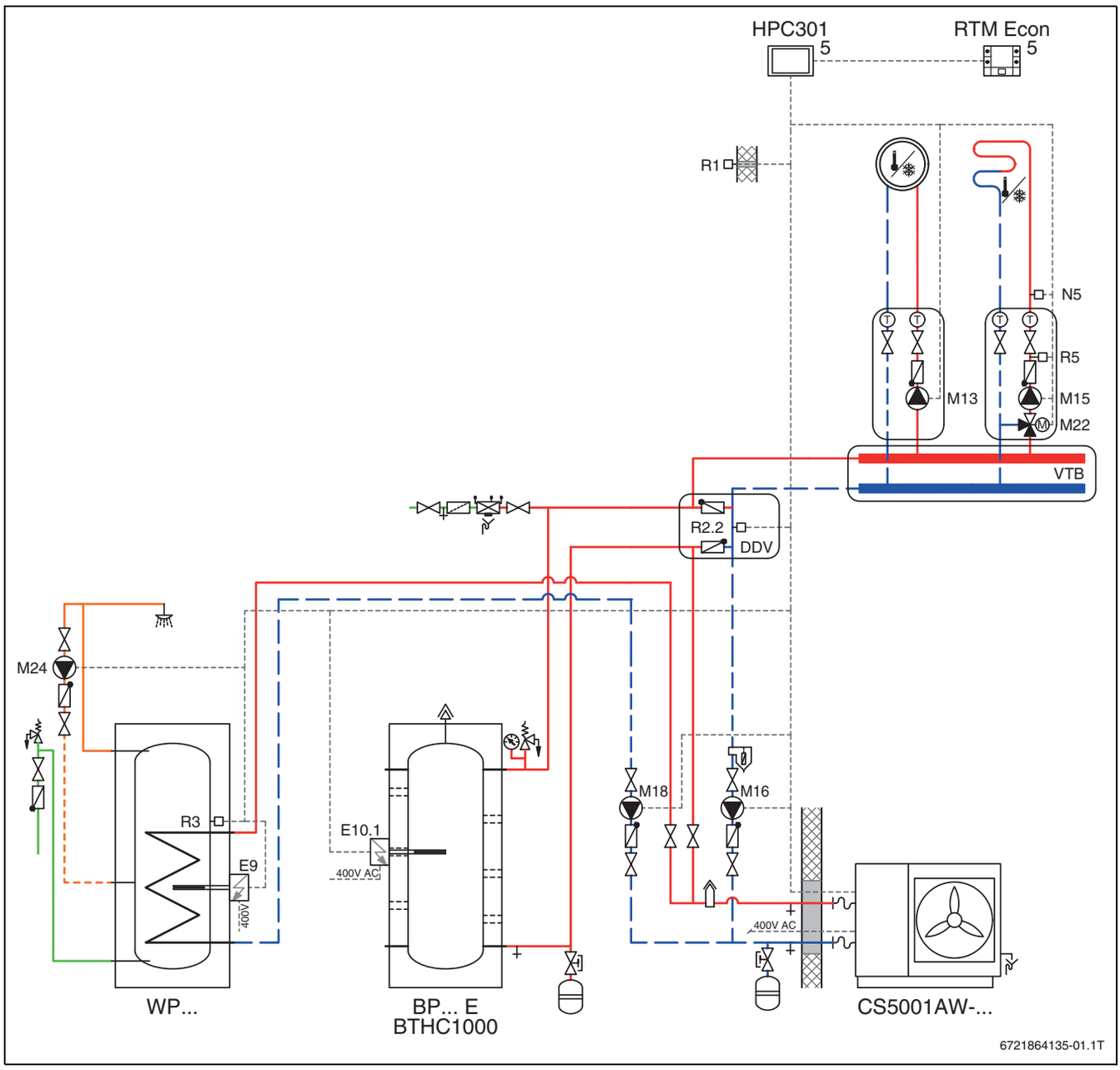

Fig. 92 Hydraulic connection diagram

E9	DHW flange heating
E10.1	Heater rod buffer storage tank
E10.2	2. Heat source
M13	Heating circuit pump 1st Heating circuit
M15	Heating circuit pump 2nd Heating circuit
M16	Source circuit pump
M18	Cylinder primary pump
M22	Mixed heating circuit with mixer
R1	Outside temperature sensor
R2.2	Return sensor
R3	Hot water sensor
R5	Sensor for mixed heating circuit
WWM	Heating circuit without mixer
MMH	Mixed heating circuit
MMB	Bivalent mixing mode
YM18	Heating/DHW diverter valve

Hydraulic components

- Air to Water Heat Pump
- Buffer cylinder
- Domestic hot water cylinder
- Heating/cooling circuit

Explanation of symbols

Symbol	Designation	Symbol	Designation	Symbol	Designation
Pipework/Electric cables					
	Flow - heating/solar		Brine return		DHW circulation
	Return - heating/solar		Potable water		Electrical wiring
	Brine flow		DHW		Electrical wiring with break
Mixing valves/valves/temperature sensors/pumps					
	Valve		Valve, motorized		Temperature sensor / switch
	Revision bypass		Valve, thermally actuated		High limit safetycut-out
	Flow regulating valve		Shut-off valve, magnetically actuated		Flue gas temperature sensor/ switch
	Overcurrent valve		Differential pressure regulator		Flue gas temperature limiter
	Filter sieve - Ball valve (with or without magnet)		Pump		Outside temperature sensor
	Cap valve		Non-return valve		Outside temperature sensor, Radio
	3-way mixing valve (mixing)		3-way mixing valve (distribution)		Thermostatic mixer
	3-way mixing valve (changeover)		3-way mixing valve (changeover, adjustable)		4-way mixing valve
	Water pressure relief valve		Safety assembly		...Radio... (e.g. controller, sensor)
Miscellaneous					
	Thermometer		Pressure gauge		Drain outlet with siphon
	Fill / drain valve		Relay		Automatic/Manual air vent
	Air separator		Water filter		Magnetite/sludge separator
	Expansion joint		DHW outlet		Heat meter
	Volumetric flow rate measuring device		Tundish		Immersion heater
	Low loss header with sensor		heat exchanger		System separation according to EN1717
	Expansion vessel with cap valve		Heating circuit, general		Underfloor heating circuit
	Ventilation heating circuit		Swimming pool heating circuit		Heating circuit function (Heating/cooling)
Module position					
1	1 on the heat/cooling source		3 in the station		5 on the wall (reference room)
4	2 on the heat/cooling source or on the wall		4 in the station or on the wall		6 in the control unit ...
Explanation of variants (V)					
V1...4-HK	Variant heating circuit	V-WE	Variant heat generator	V-FWS	Variant fresh water station
V-WP	Variant heat pump	V-SP	Variant cylinder		

Table 16 Hydraulic symbols

12 Checklist setting up the propane heat pump

Valid for Compress CS5001AW 22

This checklist is used to record that the installation conditions specified in these installation and operating instructions → Chapter 4.1, page 7 have been observed. The assembly and operating instructions form the legal basis. The following points relate exclusively to safety-related criteria. Installation requirements regarding maintenance intervals, air flow or structural stability must be considered separately.

Order number: _____

Project number: _____

End customer:	Street	Postcode	Location
_____	_____	_____	_____
System location:	Street	Postcode	Location
_____	_____	_____	_____

Subject	Criterion	Applicable	Not applicable	Not available	Remark for factory customer service or installer
Propane safety and installation area	The heat pump has been installed on a plinth at least 400 mm high or at floor level				
	The protection zone, as described in → Chapter 4.2, page 9 has been observed				
	If installed on a raised plinth, this is not solid across the entire surface, allowing for air circulation				
	All potential ignition sources are located outside the protection zone, → Fig. 4.2, page 9				Examples of potential ignition sources: lamps, electrical switches, contactors, relays, rotating parts with the potential to generate sparks Notice: In cascade systems, an additional R290 heat pump from this series does not represent an ignition source.
	There are no combustible materials or equipment with fire loads within the protection zone				
	All building openings are located outside the protection zone or are sealed airtight				Examples of building openings: windows, doors, light wells, inlets/ outlets, HVAC systems, openings to underground car parks, etc.
	All roof drains connected to the sewerage system are located outside the protection zone				
	All pipe outlets into the building are located outside the protection zone or are sealed airtight				
	The heat pump has not been installed in a trough or recess				
	The heat pump has not been installed in the garage				
Condensate drain	The condensate drain has been designed in such a manner that, in the event of a fault, NO R290 can enter the building, the sewer system or the drains of the building				Possible condensate drain options: • Siphon filled with antifreeze • Unobstructed condensate drain at the installation site ATTENTION: Beware of ice formation! • Open drain from the protection zone via a mixing section ATTENTION: Trace heating required!

Subject	Criterion	Applicable	Not applicable	Not available	Remark for factory customer service or installer
Frost protection	The heat pump manager is continuously supplied with power to ensure frost To prevent damage to the heat pump at temperatures < 4 °C, a second heat source, powered by electricity or fossil fuels, has been installed. Regulation and control can be implemented via the heat pump manager (details are described in the installation and operating instructions of the heat pump manager)				
Property boundary	The heat pump has been installed in such a way that the safety zone does not extend onto neighbouring properties or public traffic areas				
	In the event of a leak, the refrigerant cannot enter neighbouring building openings				
	The heat pump has been installed in such a manner that the safety zone does not extend onto car or HGV parking spaces				
	Where necessary, impact protection has been installed to absorb a vehicle impact at maximum speed without damaging the refrigeration circuit				

Table 17 Checklist setting up the propane heat pump

If at least one question has been answered with "NOT applicable", operation cannot continue for safety reasons. All information provided was conducted in collaboration with the customer and/or a specialist. The person signing below confirms with their signature the accuracy of the information provided and that the installation has been carried out in accordance with the installation and operating instructions supplied with the unit.

_____	_____	_____
Date	Surname, first name (upper case)	Signature of customer

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