Service instructions

DHP-A
DHP-A Opti
DHP-AL
DHP-AL Opti
DHP-C
DHP-H
DHP-H Opti
DHP-H Opti Pro
DHP-L
DHP-L Opti
DHP-L Opti Pro

VMGFC302

If these instructions are not followed during installation and service, Danfoss A/Sliability according to the applicable warranty is not binding. Danfoss A/S retains the right to make changes to components and specifications without prior notice.

The Swedish language is used for the original instructions. Other languages are a translation of original instructions.
(Directive 2006/42/EG)

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1 About documents and decals

1.1 Introduction

The following documents are available for this product:

- Installation instructions containing information to install and commission a heat pump installation. Supplied with the heat pump on delivery.
- The service instructions contain information about the heat pump's function, accessories, fault tracing and technical data. The instructions also contain tips and advice that should be followed before a heat pump installation. It is therefore recommended that the instructions are read before installation.
  The service instructions are available for download as below.
- The electrical instructions that contain the wiring diagram for the heat pump intended for fault tracing and service. The electrical instructions are available for download as below.
- The maintenance instructions must handed over and gone through with the end customer. Supplied with the heat pump on delivery.
- Country specific instructions and forms are available where relevant. Supplied with the heat pump on delivery.
- Self-adhesive decals with translation text. Must be placed on the manufacturing plate in conjunction with installation. Supplied with the heat pump on delivery.

The Service instructions and Electrical instructions are available for download here:

www.documentation.heatpump.danfoss.com

1.2 Symbols in documents

The instructions contain different warning symbols, which, together with text, indicate to the user that there are risks involved with actions to be taken.

The symbols are displayed to the left of the text and three different symbols are used to indicate the degree of danger:

DANGER! Indicates an immediate danger that leads to fatal or serious injury if necessary measures are not taken.

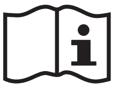
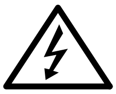
Warning! Risk of personal injury!Indicates a possible danger that can lead to fatal or serious injury if necessary measures are not taken.

Caution! Risk of installation damage.Indicates a possible hazard that can lead to item damage if necessary measures are not taken.

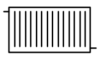
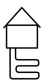
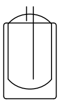
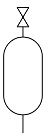
A fourth symbol is used to give practical information or tips on how to perform a procedure.

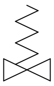
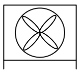
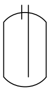
Note! Information regarding making the handling of the installation easier or a possible operational technical disadvantage.

1.3 Symbols on decals

	Warning, danger!
	Read the documentation provided.
	Read the documentation provided.
	Warning, hazardous electrical voltage!
	Warning, hot surfaces!
	Warning, moving parts!
	Warning, risk of crushing injury!

Pipe connections

	Tap water
	Heating system
	Brine
	Defrosting tank
	Expansion tank with safety valve, brine
	Bleeding

	Temperature and pressure relief valve
	Outdoor unit
	Water heater

Electrical components

	Component, normal		Component, accessory

3	Outdoor unit	353	Drip tray
50	Outdoor sensor	362	Shunt valve
54	Hot water sensor	406	Room sensor
55	Sensor hot-water top	408	EVU
71	Flow guard	417	Defrost sensor

1.4 Terminology

Table 1. Terminology

Term	Meaning
Heating system/Heat transfer fluid circuit	The circuit that generates heat to the property or to the water heater.
Supply line	The heating system’s supply line with flow direction from the heat pump to radiators/under floor heating or water heater.
Return line	The heating system’s return line with flow direction from radiators/under floor heating or water heater to the heat pump.
Circulation pump	Circulation pump for heating system or brine circuit.
Refrigerant circuit	The energy carrying circuit between the outdoor air and heating system.
Refrigerant	The gas/liquid that circulates in the refrigerant circuit.
Brine circuit	The circuit that transports energy to or from the heat source.
Brine	The fluid that circulates in the brine system.

2 Important information

Warning! Risk of personal injury! Children are not permitted to play with the product.

Caution! This product is not intended for persons (including children) with reduced physical, sensory or psychological capacity, or who do not have knowledge or experience, unless supervised or they have received instructions on how the apparatus functions from a safety qualified person.

2.1 Refrigerant

Caution! Work on the refrigerant circuit must only be carried out by a certified engineer!

Although the heat pump cooling system (refrigerant circuit) is filled with a chlorine-free and environmentally-approved refrigerant that will not affect the ozone layer, work on this system may only be carried out by authorized persons.

2.1.1 Fire risk

The refrigerant is not combustible or explosive in normal conditions.

2.1.2 Toxicity

In normal use and normal conditions the refrigerant has low toxicity. However, although the toxicity of the refrigerant is low, it can cause injury (or be highly dangerous) in abnormal circumstances or where deliberately abused.

Warning! Risk of personal injury! Spaces in which heavy vapour can collect below the level of the air must be well ventilated.

Refrigerant vapour is heavier than air and, in enclosed spaces below the level of a door for example, and in the event of leakage, concentrations can arise with a resultant risk of suffocation due to a lack of oxygen.

Warning! Risk of personal injury! Refrigerant exposed to a naked flame creates a poisonous irritating gas. This gas can be detected by its odour even at concentrations below its permitted levels. Evacuate the area until it has been sufficiently ventilated.

2.1.3 Work on the refrigerant circuit

Caution! Work on the refrigerant circuit must only be carried out by a certified engineer!

Caution! When repairing the refrigerant circuit, the refrigerant must not be released from the heat pump, it must treated in the appropriate way.

Draining and refilling must only be carried out using new refrigerant (for the amount of refrigerant see manufacturer's plate) through the service valves.

Caution! All warranties from Danfoss are void if, when filling with refrigerant other than Danfoss A/S specified refrigerant, if there has not been written notification that the new refrigerant is an approved replacement refrigerant together with other remedies.

2.1.4 Scrapping

Caution! When the heat pump is to be scrapped the refrigerant must be extracted for disposal. Local rules and regulations related to the disposal of refrigerant must be followed.

2.2 Electrical connection

Caution! Electrical installation may only be carried out by an authorized electrician and must follow applicable local and national regulations.

DANGER! Hazardous electrical voltage! The terminal blocks are live and can be highly dangerous due to the risk of electric shock. All power supplies must be isolated before electrical installation is started. The heat pump is connected internally at the factory, for this reason electrical installation consists mainly of the connection of the power supply.

2.3 Commissioning

Caution! The installation may only be commissioned if the heating system is filled and bled. Otherwise the circulation pump can be damaged.

Caution! If the installation is only to operate using an auxiliary heater during the installation, ensure that the heating system is filled and bled and that the compressor cannot be started. This is carried out by setting the operating mode to INFORMATION --> OPERAT.--> AUX. HEATER

3 Check and safety functions

The heat pump has a number of check and safety functions to protect the installation against damage during abnormal operating conditions.

The diagram below shows the heat pump's three circuits with respective safety functions.

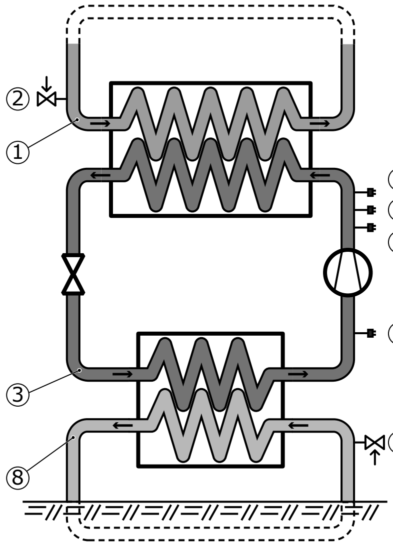


Figure 1. Check and safety functions

Symbol explanation

1	Heat transfer fluid circuit
2	Safety valve, heat transfer fluid circuit, externally mounted
3	Refrigerant circuit
4	Operating pressure switch, normal
5	Operating pressure switch, alternative (only on certain heat pumps)
6	High pressure switch
7	Low pressure switch
8	Brine circuit
9	Safety valve, brine fluid circuit, externally mounted

Heat transfer fluid circuit (1)

If the pressure in this circuit exceeds the opening pressure for the safety valve (2), the valve opens, releases the overpressure and closes again. The safety valve overflow pipe must have an open connection to the drain and visibly flow into this in a frost-free environment.

Refrigerant circuit (3)

The refrigerant circuit's high pressure side is equipped with a high pressure switch (6) and one or two operating pressure switches (4, 5), only one of which is connected. The connected operating pressure switch stops the compressor when the working pressure is reached, which is when sufficient heat energy has been produced.

If the operating pressure switch does not work and the pressure continues to increase in the circuit, the high pressure switch activates when its break pressure is reached, whereupon the compressor stops and the heat pump's normal operation is blocked.

If the high pressure switch is activated an alarm indicator flashes on the heat pump's control panel and a warning text appears in the display of the control panel. The blocked heat pump is reset by setting the operating mode to OFF and then back to the previously selected mode.

The low pressure switch (7) stops the compressor and blocks the heat pump's operation if the pressure becomes too low in the cooling circuit's low pressure side.

If the low pressure switch is activated, the heat pump's normal operation is blocked, an alarm indicator on the heat pump's control panel flashes and a warning text appears in the display of the control panel. The blocked heat pump is reset by setting the operating mode to OFF and then back to the previously selected mode.

Brine circuit (8)

If the pressure in this circuit exceeds the opening pressure for the safety valve (9), the valve opens, releases the overpressure and closes again. The safety valve overflow pipe must have an open connection to the drain and visibly flow into this in a frost-free environment.

Compressor

The compressor is equipped with a thermal over current relay to protect it against over current.

If the thermal over current relay (position 1 in the image below) is activated, the heat pump's normal operation is blocked, an alarm indicator on the heat pump's control panel flashes and a warning text appears in the display of the control panel.

The blocked heat pump is reset by setting the operating mode to OFF and then back to the previously selected mode.

The compressor is also equipped with an internal protector that stops the compressor if it risks becoming overheated. The internal protector cannot be reset manually, the compressor must cool before it can be restarted. No alarm connected to this protector.

Circulation pumps

The circulation pumps have internal overload protectors, which are reset automatically after cooling.

The overload protectors in circulation pumps for 10 - 16 kW heat pumps (8 - 12 kW air/water heat pumps) also activate the alarm for motor protection and block the heat pump's normal operation. Indication and resetting occur in the same way as for the compressor.

Alarm mode

If an alarm that affects the heat pump's normal operation is activated this will be indicated in the display window. In order to further attract attention, the heat pump will not produce hot water.

The heat pump will initially meet the heat demand using the compressor. If this is not possible, the built-in electric heating element engages.

Auxiliary heater, electric heating element

The auxiliary heater consists of an electric heating element mounted on the heating system supply line. It has an overheat protector that switches off the electric heating element if it is at risk of becoming overheated. The overheat protector's control unit is on the electrical panel (position 2 in the image below).

If the overheat protector is activated an alarm indicator flashes on the heat pump's control panel and a warning text appears.

The overheat protector is reset by pushing the reset button (position 3 in the image below).

Electrical system

The heat pump control is fused with fuse F0 (position 4 in the image below).

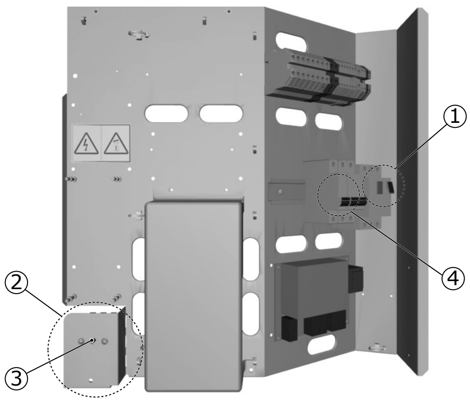


Figure 2. Component location

Symbol explanation

1	Thermal over current relay F11
2	Overheating protection
3	Reset button
4	Fuse F0

Technical data

See Technical data for detailed technical specifications.

4 Heat pump data, components

Note! Illustrations of products are not precise drawings and must only be considered as schematic images. Differences in component parts may occur.

4.1 DHP-H, DHP-H Opti

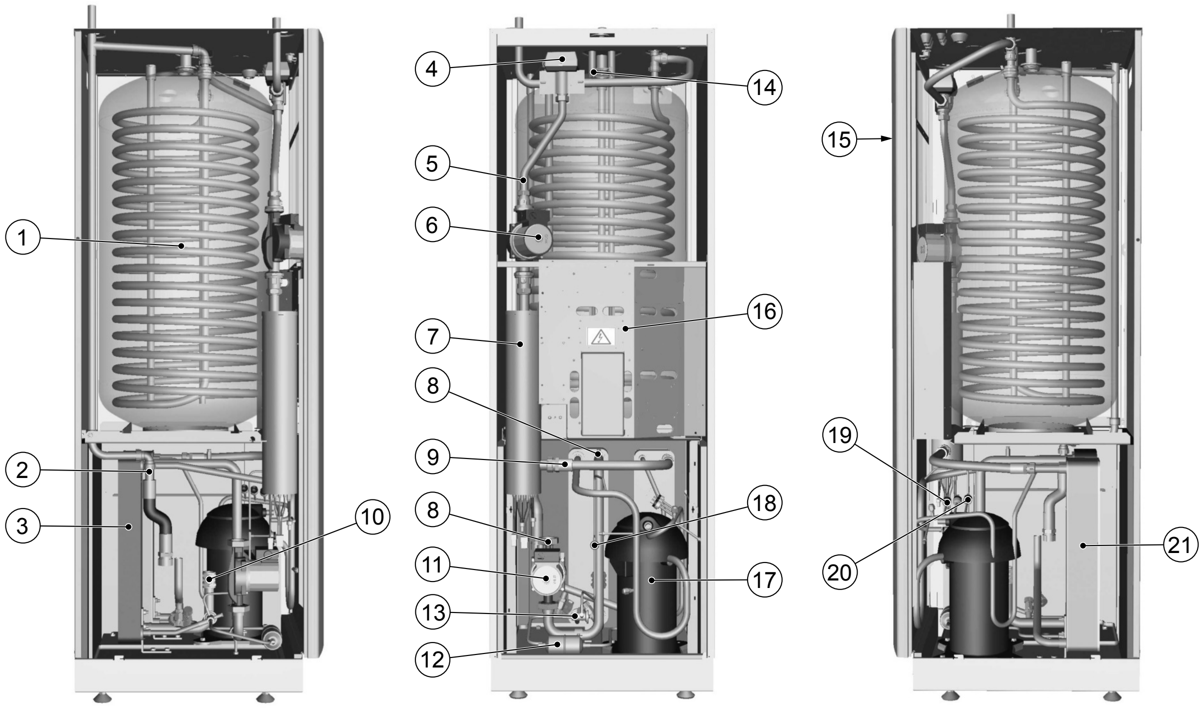


Figure 3. Components

Symbol explanation

1	Water heater, 180 litres	12	Drying filter
2	Return pipe sensor, heating system	13	Expansion valve
3	Evaporator, insulated	14	Hot water temperature sensor (displays maximum temperature)
4	Reversing valve	15	Control panel for control equipment
5	Supply line sensor	16	Electrical panel
6	Heating system circulation pump	17	Compressor
7	Auxiliary heating, immersion heater	18	Low pressure switch
8	Brine in	19	Operating pressure switch
9	Heating system supply line	20	High pressure switch
10	Brine out	21	Condenser with primary side drain
11	Circulation pump coolant system		

4.2 DHP-H Opti Pro

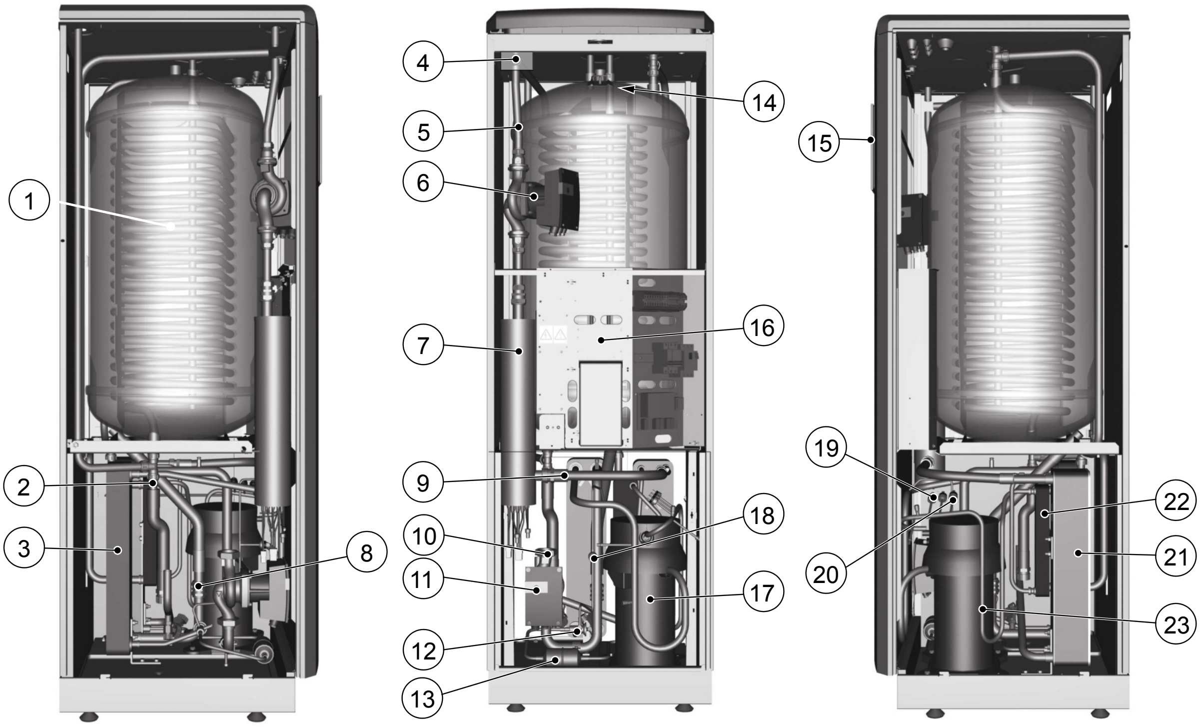


Figure 4. Components

Symbol explanation

1	Water heater, 180 litres	13	Drying filter
2	Return pipe sensor, heating system	14	Hot water temperature sensor (displays maximum temperature)
3	Evaporator, insulated	15	Control panel for control equipment
4	HGW shunt valve	16	Electrical panel
5	Supply pipe sensor, heating system	17	Compressor
6	Heating system circulation pump	18	Low pressure switch
7	Auxiliary heating, immersion heater	19	Operating pressure switch
8	Brine out	20	High pressure switch
9	Heating system supply line	21	Condenser with primary side drain
10	Brine in	22	De-superheater
11	Circulation pump coolant system	23	HGW sensor
12	Expansion valve		

4.3 DHP-C

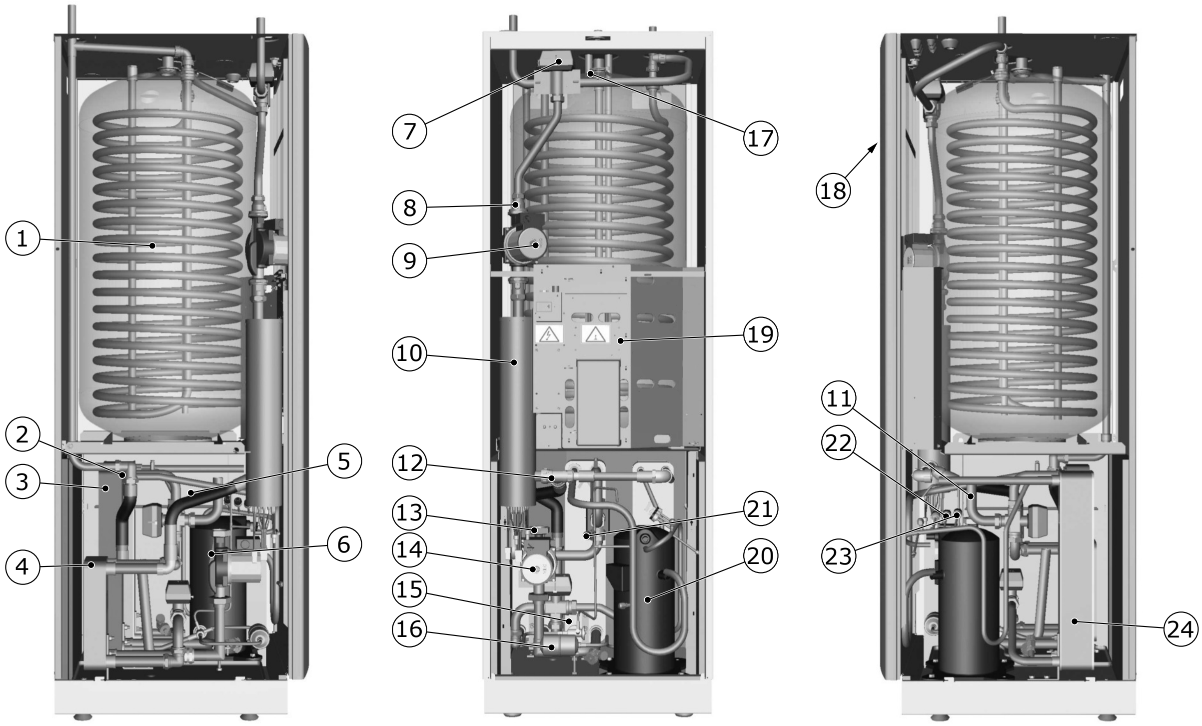


Figure 5. Components

Symbol explanation

1	Water heater, 180 litres
2	Return pipe sensor, heating system
3	Evaporator, insulated
4	Heat exchanger for cooling operation
5	Exchange valve cooling
6	Shunt cooling
7	Exchange valve, heating/hot water
8	Supply line sensor
9	Heating system circulation pump
10	Auxiliary heating, immersion heater
11	Brine in
12	Heating system supply line
13	Brine out
14	Circulation pump, brine system
15	Expansion valve
16	Drying filter
17	Hot water temperature sensor (displays maximum temperature)
18	Control panel for control equipment
19	Electrical panel
20	Compressor
21	Low pressure switch
22	Operating pressure switch
23	High pressure switch
24	Condenser with primary side drain

4.4 DHP-L, DHP-L Opti

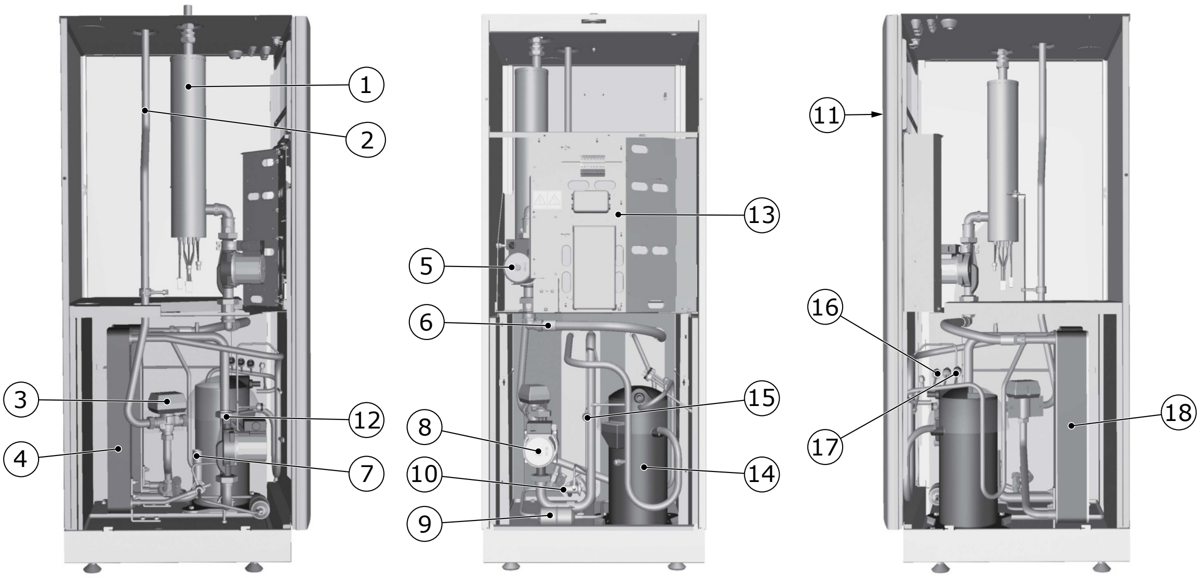


Figure 6. Components

Symbol explanation

1	Auxiliary heater, immersion heater on supply line	10	Expansion valve
2	Return pipe, heating system	11	Control panel for control equipment
3	Reversing valve	12	Brine in
4	Evaporator, insulated	13	Electrical panel
5	Heating system circulation pump	14	Compressor
6	Supply pipe sensor, heating system	15	Low pressure switch
7	Brine out	16	Operating pressure switch
8	Circulation pump coolant system	17	High pressure switch
9	Drying filter	18	Condenser with primary side drain

4.5 DHP-L Opti Pro

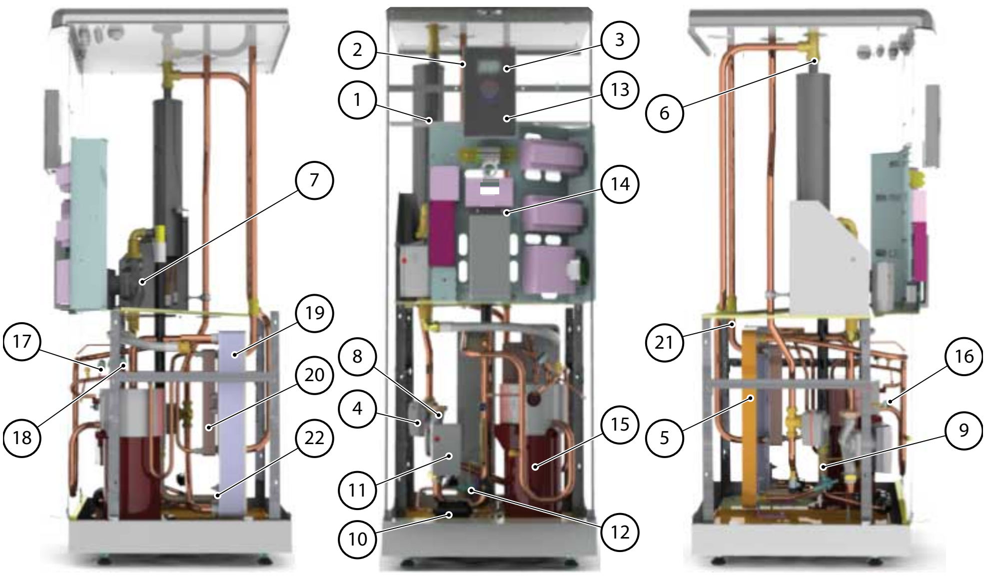


Figure 7. Components

Symbol explanation

1	Auxiliary heater, immersion heater on supply line	12	Expansion valve
2	Return pipe, heating system	13	Control panel for control equipment
3	Supply line water heater	14	Electrical panel
4	HGW shunt valve	15	Compressor
5	Evaporator, insulated	16	Low pressure switch
6	Supply pipe sensor, heating system	17	Operating pressure switch
7	Circulation pump, heating system	18	High pressure switch
8	Brine in	19	Condenser with primary side drain
9	Brine out	20	De-superheater
10	Drying filter	21	HGW sensor
11	Circulation pump, brine system	22	Return pipe sensor, heating system

4.6 DHP-A, DHP-A Opti

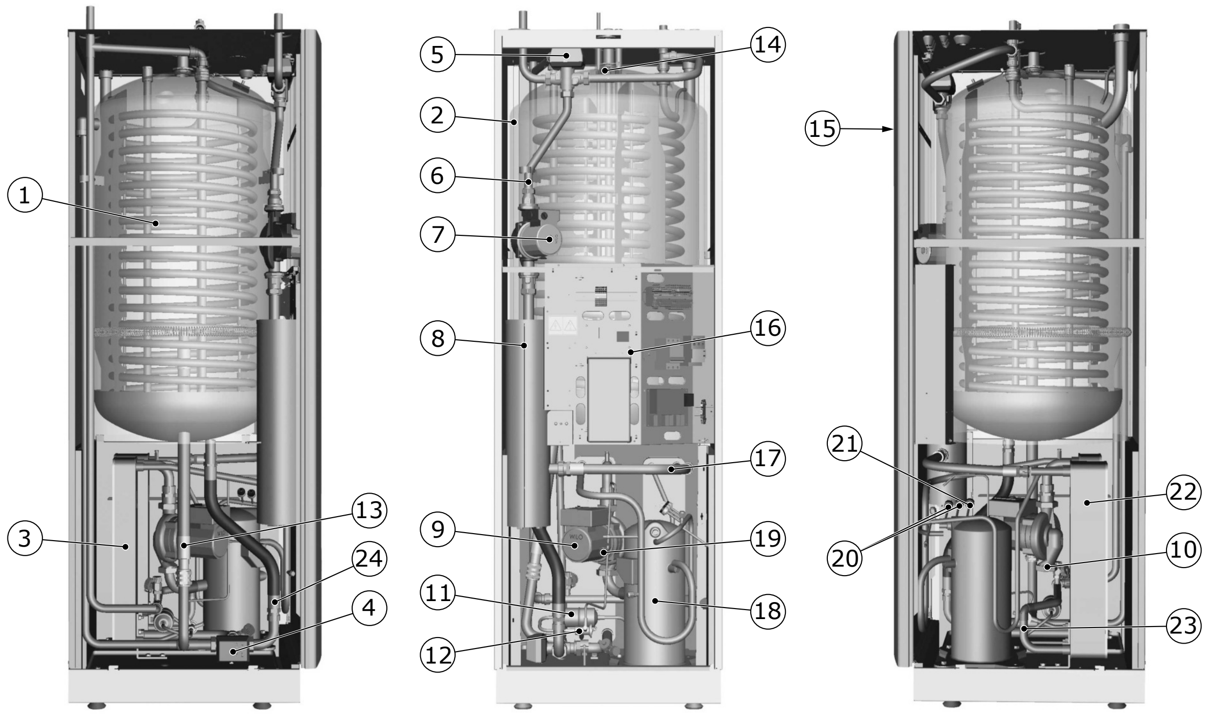


Figure 8. Components

Symbol explanation

1	Water heater, 180 litres	13	Brine out
2	Defrosting tank	14	Hot water temperature sensor (displays maximum temperature)
3	Evaporator, insulated	15	Control panel for control equipment
4	Exchange valve, defrosting	16	Electrical panel
5	Exchange valve, heating system	17	Heating system supply line
6	Supply line sensor	18	Compressor
7	Heating system circulation pump	19	Low pressure switch
8	Auxiliary heating, immersion heater	20	Operating pressure switches
9	Circulation pump coolant system	21	High pressure switch
10	Brine in	22	Condenser with primary side drain
11	Drying filter	23	Return pipe sensor, heating system
12	Expansion valve	24	Brine in to defrosting tank during defrosting

4.7 DHP-AL, DHP-AL Opti

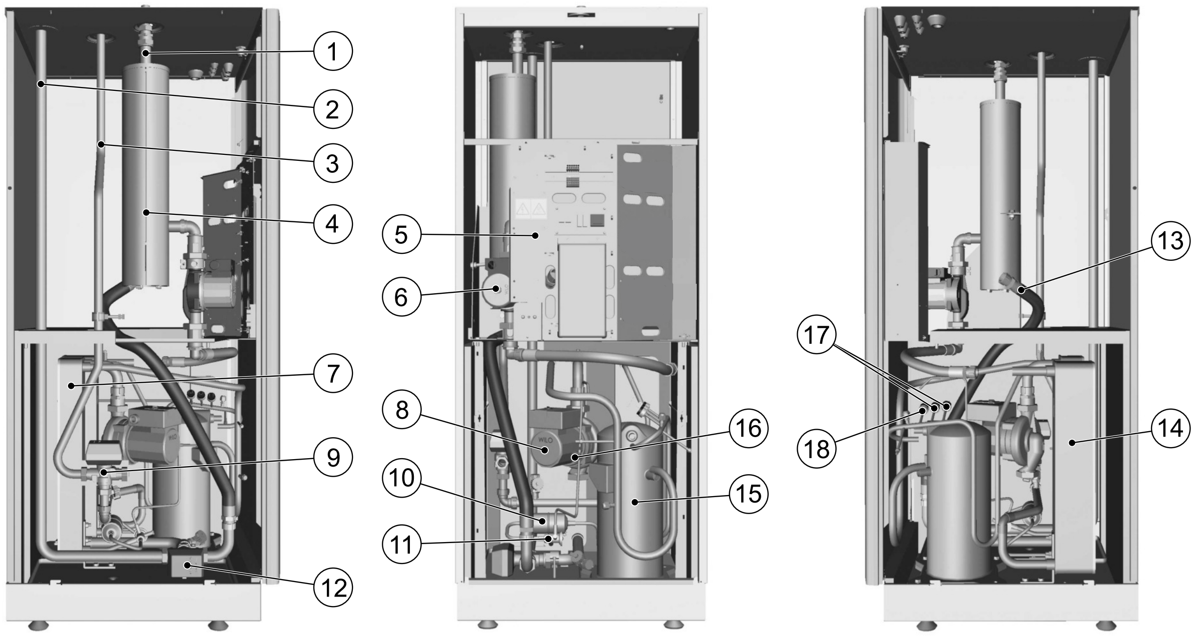
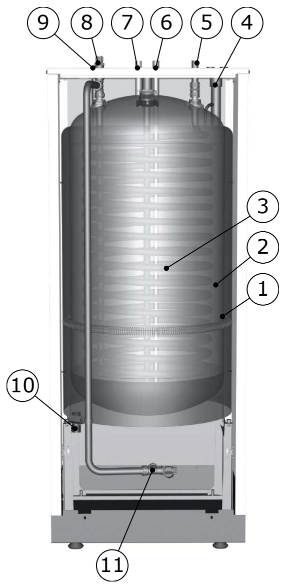


Figure 9. Components

Symbol explanation

1	Heating system supply pipe	10	Drying filter
2	Brine out to outdoor unit	11	Expansion valve
3	Return pipe, heating system	12	Shunt valve defrosting
4	Auxiliary heating, immersion heater	13	Brine in to defrosting tank during defrosting
5	Electrical panel	14	Condenser
6	Heating system circulation pump	15	Compressor
7	Evaporator	16	Low pressure switch
8	Circulation pump coolant system	17	Operating pressure switches
9	Exchange valve, heating system	18	High pressure switch



Symbol explanation

1	Defrosting tank
2	Water heater
3	TWS coil
4	Connection, expansion line when outdoor unit is positioned at high level
5	Connection, to TWS coil
6	Cold water line, 22 mm
7	Hot water line, 22 mm
8	Bleed valve, at stainless steel water heater
9	Connection, brine out, during defrost
10	Connection, brine from heat pump
11	Connection, return pipe to heat pump

4.8 Outdoor unit DHP-A, DHP-AL, DHP-A Opti, DHP-AL Opti

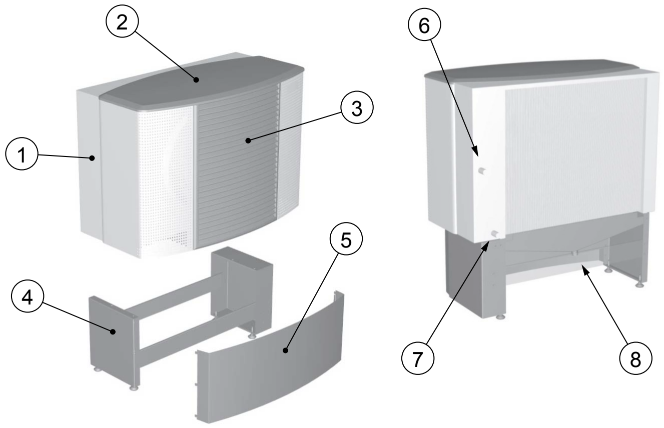


Figure 10. Outdoor unit and connections

Symbol explanation

1	Outdoor unit	5	Cover
2	Cover	6	Connection, brine in to outdoor unit
3	Front cover	7	Connection, brine out from outdoor unit
4	Stand	8	Connection, drain drip tray

5 Transport, unpacking and setting-up

5.1 Separating the heat pump

Note! Does not apply to DHP-L, DHP-L Opti, DHP-L Opti Pro, DHP-AL, DHP-AL Opti.

If there is a shortage of space when transporting the heat pump to the installation location it may be necessary to separate the heat pump unit and the water heater.

The following instruction describes how a heat pump is separated to transport the separate parts more easily.

Warning! Do not lift heavy equipment alone, always use two people for heavy lifting.

1. Remove the packaging.
2. Detach the front cover by twisting the catch 90° anti-clockwise, at the same time hold the front cover with one hand.
3. Tilt the front cover outwards.
4. Lift the front cover upwards to remove it from the heat pump.

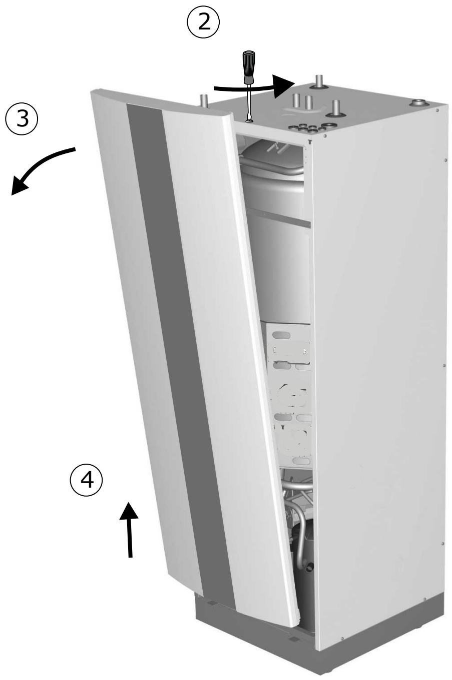


Figure 11. The front cover

5. Carefully pull the switch free from the control panel.
6. Unscrew the front stay bar and top panel.
7. Pull the side panels forward and then upwards and outwards to remove them.

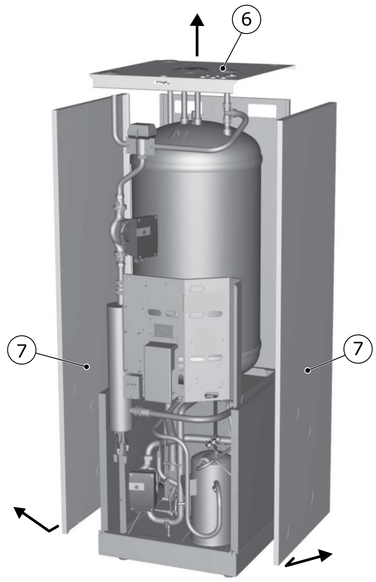


Figure 12. Top panel and side panels

8. Slacken off the screws that hold the rear panel and remove it.
9. Disconnect the electrical connectors at the exchange valve, circulation pump and electrical auxiliary heater.
10. Disconnect the cables for the following sensors at the electrical panel:
    - Supply line (301, 302)
    - Hot water (311, 312)
    - Top sensor (325, 326)
11. Unscrew the electrical panel's screws.
12. Turn the electrical panel through 180 degrees and place it in front of the heat pump.

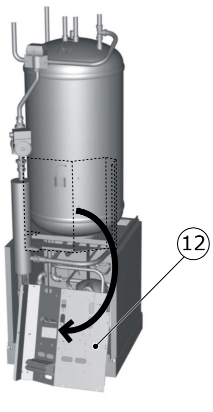


Figure 13. Electrical panel

13. Disconnect the T-pipe connector from the return line under the heater, see figure below.

14. Disconnect the flexible hose at the electrical auxiliary heater, see figure below.

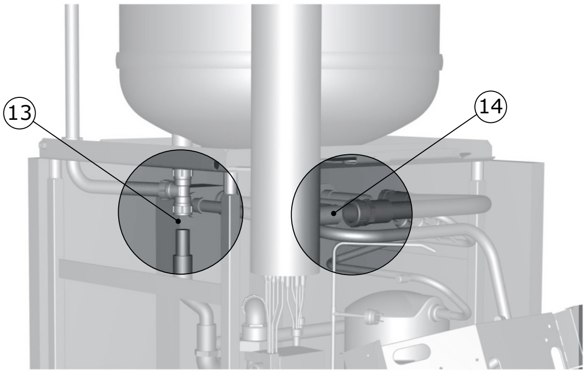


Figure 14. Connections

15. Unscrew the four screws in the corners that hold the water heater’s bottom plate.

Warning! Always use two people for heavy lifting.

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16. Lift off the unit with the water heater, pipe and electrical auxiliary heater.

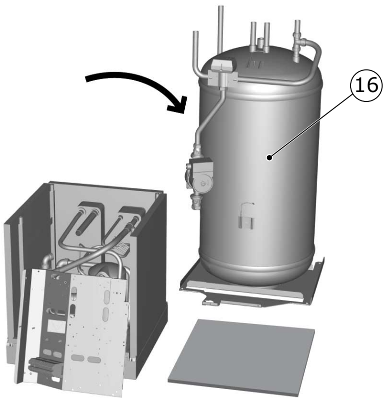


Figure 15. Separating

17. Put the unit down carefully on a floor protector.

6 Piping installation

6.1 Information collector pipe

Caution! Local rules and regulations related to type of collector must be followed.

Borehole collector: Fully welded plastic pipe collector (PEM PN 6.3) according to the applicable local and national regulations with factory manufactured return bend.

Ground collector: Fully welded plastic pipe collector (PEM PN 10) according to the applicable local and national regulations.

In countries where frost damage occurs, the collector pipe beside an outer wall (minimum 2 metres) must be insulated in such a way that frost damage is prevented. This applies regardless of ground, rock or lake heat.

Minimum shaft depth between the energy well and the building is 0.5 m. If burial to that depth is not possible the pipes must be protected against any external mechanical damage.

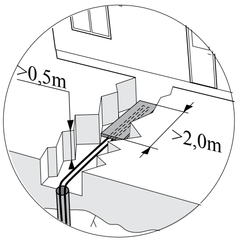


Figure 16. Shaft depth for, and insulation of, collector hoses

6.2 Connection of several brine coils

When several brine coils are used for a heat pump installation, regardless of what heat source is used, the length of the coils must not exceed the values in the following tables. The coil lengths are based on ethanol 30% at 0°C.

For hoses of type PEM DN 32, $Ø_i$ = 28.0:

Table 2. Maximum coil length, hose type PEM DN 32, Øi = 28.0

DHP-H, DHP-C, DHP-L	**Calculated maximum coil length per coil, in metres**			
Size	**1 coil**	**2 coils**	**3 coils**	**4 coils**
6	<390	<2 x 425	-	-
8	<300	<2 x 325	-	-
10	<270	<2 x 395	-	-
12	<190	<2 x 350	-	-
16	<70	<2 x 175	<3 x 183	4 x 197

Table 3. Maximum coil length, hose type PEM DN 32, Øi = 28.0

DHP-H Opti, DHP-H Opti Pro, DHP-L Opti, DHP-L Opti Pro	**Calculated maximum coil length per coil, in metres**			
Size	**1 coil**	**2 coils**	**3 coils**	**4 coils**
6	<390	<2 x 425	-	-
8	<320	<2 x 345	-	-
10	<250	<2 x 365	-	-
12	<170	<2 x 315	-	-
16	<80	<2 x 200	<3x 207	<4 x 225

For hose of type PEM DN 40, Øi = 35.2:

Table 4. Maximum coil length, hose type PEM DN 40, Øi = 35.2

DHP H, DHP-C, DHP-L	Calculated maximum coil length per coil, in metres			
Size	**1 coil**	**2 coils**	**3 coils**	**4 coils**
6	<1000	-	-	-
8	<750	-	-	-
10	<1000	-	-	-
12	<700	<2 x 1000	-	-
16	<220*	<2 x 444*	-	

Table 5. Maximum coil length, hose type PEM DN 40, Øi = 35.2

DHP-H Opti, DHP-H Opti Pro, DHP-L Opti, DHP-L Opti Pro	Calculated maximum coil length per coil, in metres			
Size	**1 coil**	**2 coils**	**3 coils**	**4 coils**
6	<1000	-	-	-
8	<780	-	-	-
10	<980	-	-	-
12	<630	<2 x 1000	-	-
16	<250*	<2 x 1000	-	-

*) When dimensioning size 16, a borehole depth that exceeds this recommendation for coil length is often required. In such cases two coils should be used.

The different brine coils are distributed from a common collection well. All return lines are led back to the well and are equipped with choke valves because the flow of each individual coil must be adjusted.

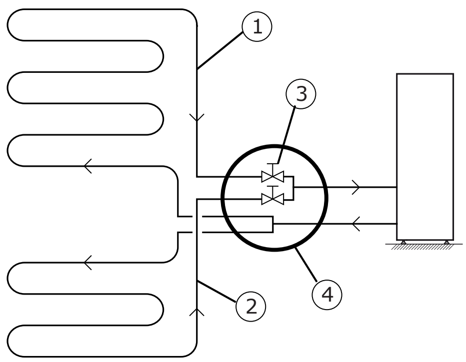


Figure 17. The collection well for distributing to several brine coils

Symbol explanation

1	Brine coil 1
2	Brine coil 2
3	Choke valves
4	Collection well

Choke valves with flow indicators (available as accessories from the Danfoss range) are used to adjust the brine flow so that it is the same in all coils.

If choke valves with flow indicators are not available adjust the valves until the temperature of all the coil return hoses is the same.

6.3 Noise information

6.3.1 Preventative measures

Some of the following points can also be used when troubleshooting.

- Do not install heat pumps on walls adjoining bedrooms.

- Ensure that all pipes are elastically suspended, with mountings as illustrated or similar. This is so that the rubber (or similar material) compresses 1 to 2 mm under vibration. It is not recommended to suspend the pipes from too many points, as the force at each mounting is then not sufficient.

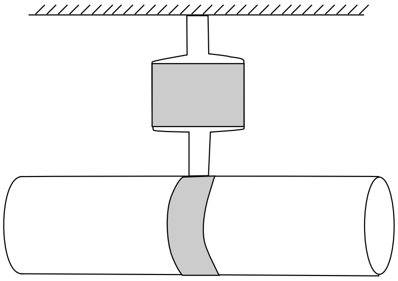


Figure 18. Elastic pipe suspension.

- If the heat pump is located indoors and the ceiling in the area is unsuitable to suspend the aforementioned pipe mountings, set up (or construct) special stands on the floor from which the pipes can be suspended.
- Ensure that pipe lines do not lie against walls that they run along and that foam insulation is wrapped around the entire pipe, not just on top of it.
- Pipes inside the heat pump must not be against each other (if they are, clamp and secure suitable rubber, pulling the pipes apart by hand only helps temporarily).
- If the heat pump is on an unstable surface, position rubber feet designed for its weight underneath.
- If necessary, use rubber straps to secure flexible hoses in position, so that they do not lie against each other or create vibration bridges.
- Ensure that electrical wiring is not put under strain, if it is it creates vibration bridges.
- If possible, install the heat pump in a location that is sound insulated from areas that are frequented by residents.

Soundproofing measures to carry out afterwards:

- Go through the aforementioned points and improve if possible.
- Hood for compressor (most effective for high frequencies).
- Improve the acoustic environment of the heat pump by installing acoustic panels on the walls and ceiling.
- In some instances, it is recommended that the heat pump is moved to another area.

6.3.2 Laying cabling

Note! Electrical connection can also cause noise so this installation must be carried out appropriately. An appropriate installation is where there is approximately 300 mm free cable between the heat pump and the building. It is inappropriate to bolt trunking between the heat pump and the wall. This is because vibrations can then be transmitted from the heat pump through the trunking to the walls of the house.

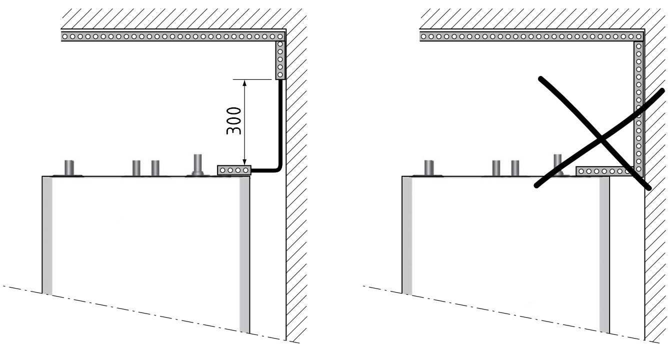


Figure 19. Recommended distance between trunking on the wall and trunking on the heat pump is 300 mm

7 Electrical Installation

7.1 Cable connection

- When the cable is connected to the terminal block a screwdriver is used to open the terminal block, see figure below.

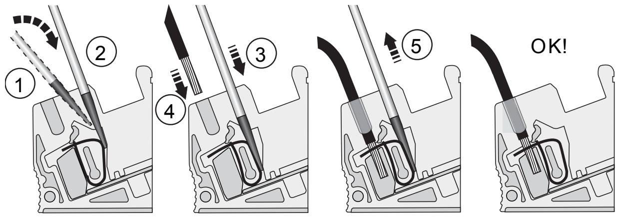


Figure 20. Connecting cable to terminal block

8 Installing accessories/additional functions

DANGER! Hazardous electrical voltage! The terminal blocks are live and can be highly dangerous due to the risk of electric shock. All power supplies must be isolated before electrical installation is started.

8.1 Room sensor

The room temperature sensor has a temperature sensor that provides a further value that the control system can use when calculating the supply temperature. The impact of the room sensor in the calculation can be set in the menu HEAT CURVE -> ROOM FACTOR. Default setting for ROOM FACTOR is 2 but can be adjusted from 0 (no impact) to 4 (large impact).

The difference between the desired and actual indoor temperature is multiplied by the set value for ROOM FACTOR. The set point on the heating system's supply line increases or decreases with the result depending on whether there is a deficit or surplus of heat.

The table below shows examples of how the set point for the supply line is affected at CURVE 40 with different settings for ROOM FACTOR.

In the event of a heating deficit:

Table 6. Heating deficit

ROOM FACTOR	Desired room temperature, °C	Actual room temperature, °C	Set point for supply line, °C
0	20	18	40
1	20	18	42
2	20	18	44
3	20	18	46
4	20	18	48

In the event of a surplus of heat the conditions are the opposite:

Table 7. Heat surplus

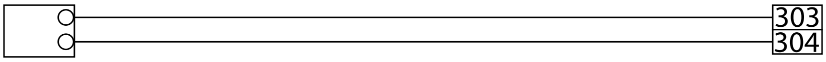
ROOM FACTOR	Desired room temperature, °C	Actual room temperature, °C	Set point for supply line, °C
0	20	22	40
1	20	22	38
2	20	22	36
3	20	22	34
4	20	22	32

Note! The room sensor is connected to a safety extra-low voltage.

1. Install the room temperature sensor in a location in the house where the room temperature is relatively constant:
   - Centrally located in the house
   - At eye level
   - Not in direct sunlight
   - Not in a draft

- Not in a room with alternative heating

2. Break all power supply to the heat pump.
3. Remove the front cover from the heat pump.
4. Route the room sensor's connecting cable through the opening in the top panel up to the connecting block.
5. Connect the cable as follows.



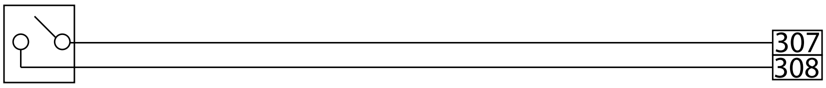
6. Install the front cover on the heat pump. Switch on the power supply.
7. Hang a thermometer next to the room sensor.
8. Calibrate the sensor by holding in both buttons for 15 seconds until the display starts to flash.
9. Set the actual room temperature that the thermometer shows.
10. Wait 10 seconds until the display stops flashing.

If the display shows "--" for indoor temperature no indoor temperature has been read.

8.2 EVU function

When connecting between terminal blocks 307 and 308 the EVU (Elektrizitäts Versorgungs Unternehmen) function is achieved. This prevents operation of the heat pump, auxiliary heater and circulation pump for the brine circuit. The exception is the circulation pump heating circuit which is permitted to run. The text EVU STOP is shown in the display when this function is active.

1. Break all power supply to the heat pump.
2. Remove the front cover from the heat pump.
3. Route the EVU function's connecting cable through the opening in the top panel up to the connecting block.
4. Connect the cable as illustrated below.



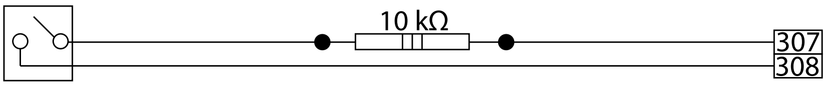
5. Install the front cover on the heat pump. Switch on the power supply.

8.3 Tariff control

When connecting between terminal blocks number 307 and 308 over a 10 kohms resistor the tariff control function is active which gives the opportunity of a recurring temporary reduction of the indoor temperature.

The extent of the tariff control is set in the menu INFORMATION -> HEAT CURVE -> REDUCTION.

1. Break all power supply to the heat pump.
2. Remove the front cover from the heat pump.
3. Route the tariff control function's connecting cable through the opening in the top panel forward to the connecting block.
4. Connect the cable as illustrated below.



5. Install the front cover on the heat pump. Switch on the power supply.

8.4 Level switch

In certain countries there is a requirement that the heat pump must be equipped with a level switch for the brine system. Always check local rules and regulations before commissioning the heat pump.

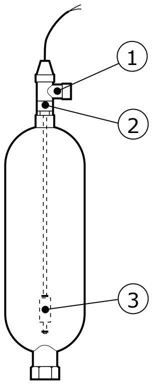


Figure 21. Level switch in the expansion tank/bleed tank

Symbol explanation

1	Safety valve
2	Level switch
3	Floats

- Connect the flow sensor according to the installation instructions supplied with the accessory .

9 Important parameters

9.1 Heat production - calculating

The indoor temperature is adjusted by changing the heat pump's heat curve, which is the control system's tool for calculating what the supply temperature should be for water that is sent out in the heating system. The heat curve calculates the supply temperature depending on the outdoor temperature. The lower the outdoor temperature, the higher the supply temperature. In other words, the supply temperature of the water fed to the heating system will increase linearly as the outdoor air temperature falls.

The heat curve will be adjusted in connection with installation. It must be adapted later on, however, to obtain a pleasant indoor temperature in any weather conditions. A correctly set heat curve reduces maintenance and saves energy.

9.2 CURVE

The control computer shows the value for CURVE by means of a graph in the display. The heat curve can be changed by adjusting the CURVE value. The CURVE value indicates the supply temperature of the water that is wanted to the heating system at an outdoor temperature of 0°C.

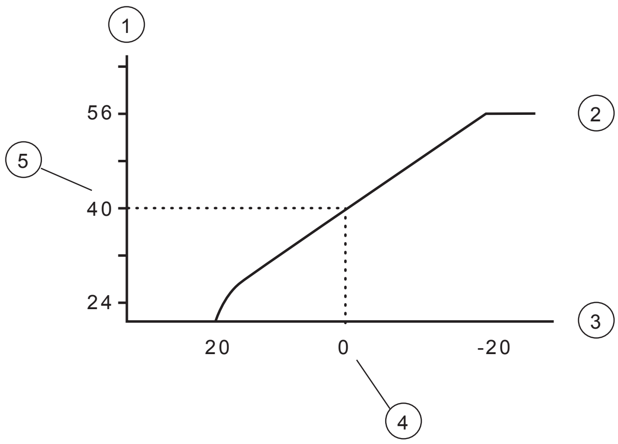


Figure 22. Graph showing the set value 40 for CURVE.

Position	Description
1	Temperature (°C)
2	Maximum setpoint value
3	Outdoor temperature (°C)
4	0°C
5	Set value (standard 40°C).

In the event of outdoor temperatures below 0°C, a higher setpoint value is calculated and in the event of outdoor temperatures greater than 0°C, a lower setpoint value is calculated.

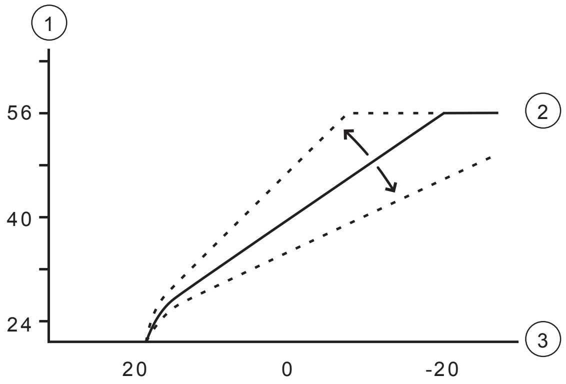


Figure 23. Increasing or reducing the CURVE changes the slope of the curve.

Position	Description
1	Temperature (°C)
2	Maximum setpoint value
3	Outdoor temperature (°C)

If the CURVE value is increased, the heat curve will become steeper and if the value is reduced, it will become flatter.

The most energy efficient and cost effective setting is achieved by changing the CURVE value which leads to fewer starts and longer operating times. For a temporary increase or reduction, adjust the ROOM value instead.

9.3 ROOM

If you wish to increase or reduce the indoor temperature, change the ROOM value. The difference between changing the ROOM value and the CURVE value is as follows:

- When changing the ROOM value, the angle of the curve on the system's heat curve does not change, instead the entire heat curve is moved by 3°C for every degree change of the ROOM value. The reason that the curve is adjusted 3°C is that an approximate 3°C increase in supply temperature is usually needed to increase the indoor temperature 1°C.

- When changing the CURVE value, the angle of the curve on the system's heat curve changes.

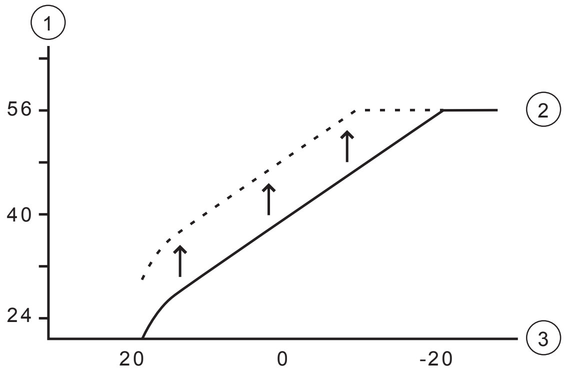


Figure 24. Changing the ROOM value changes the heat curve upwards or downwards.

Position	Description
1	Supply temperature (°C)
2	Maximum supply temperature
3	Outdoor temperature (°C)

The relationship of the supply temperature to the outdoor temperature will not be affected. The supply temperature will be increased or reduced by the same number of degrees all along the heat curve. I.E. The entire heat curve rises or drops instead of the curve gradient changing.

This method of adjusting the indoor temperatures can be used for a temporary raise or drop. For long term increases or reductions of the indoor temperature, the heat curve should be adjusted.

9.4 HEAT STOP

The HEAT STOP function automatically stops all production of radiator heat when the outdoor temperature is equal to, or higher than, the value entered for heat stop.

When the heat stop function is activated, the circulation pump will be turned off - except when hot water is being produced. The circulation pump will be "exercised" for one minute per day. The factory set value for activating heat stop is an outdoor temperature of 17°C. If the heat stop function is active, the outdoor temperature must drop 3°C when setting, before the heat stop is de-activated.

9.5 MIN and MAX

The MIN and MAX values are the lowest, respectively highest set point values that are allowed for the supply temperature.

Adjusting the minimum and maximum supply temperatures is particularly important if your home has under floor heating.

If your house has under floor heating and parquet floors, the supply line temperature must not exceed 45°C. Otherwise the floor might get damaged. If you have under floor heating and stone tiles, the MIN value should be 22-25°C, even in summer when no heating is required. This is to achieve a comfortable floor temperature.

If your house has a basement, the MIN value should be adjusted to a suitable temperature for the basement in summer. A condition for maintaining the heat in the basement in the summer is that all radiators have thermostat valves that switch off the heat in the rest of the house. It is extremely important that the heating system and the radiator valves are trimmed correctly. As it is usually the end customers themselves who have to carry out trimming, remember to inform them how to carry it out correctly. Also remember that the value for HEAT STOP needs adjusting upwards for summer heating.

9.6 TEMPERATURES

The heat pump can display a graph showing the history of the various sensors' temperatures and you can see how they have changed over 60 measurement points in time. The time interval between the measurement points can be adjusted between one minute and one hour, factory setting is one minute.

History is available for all sensors, but only the set value is shown in the display for the room sensor. The integral value that may appear is the heating system's energy balance.

9.7 INTEGRAL

The heat demand in the house depends on the season and weather conditions and is not constant. The heat demand can be expressed as temperature difference over time and can be calculated giving an integral value as a result (heat demand). To calculate the integral value, the control system uses several parameters.

A heat deficit is needed to start the heat pump, and there are two integral values, A1 (default value = -60), which starts the compressor and A2, (factory set = -600), which starts the auxiliary heater and A3, which starts the external auxiliary heater. During heat production, the deficit reduces and when the heat pump stops, the inertia in the system causes a surplus of heat.

The integral value is a measurement of the area under the time axis and is expressed in degree minutes. The figure below shows the factory settings for the integral values that the heat pump has. When the integral value has reached the set value for INTEGRAL A1 the compressor starts. If the integral value does not reduce but continues to increase the internal additional heat will start when the integral value reaches the set value for A2 and the external value at set value for A3

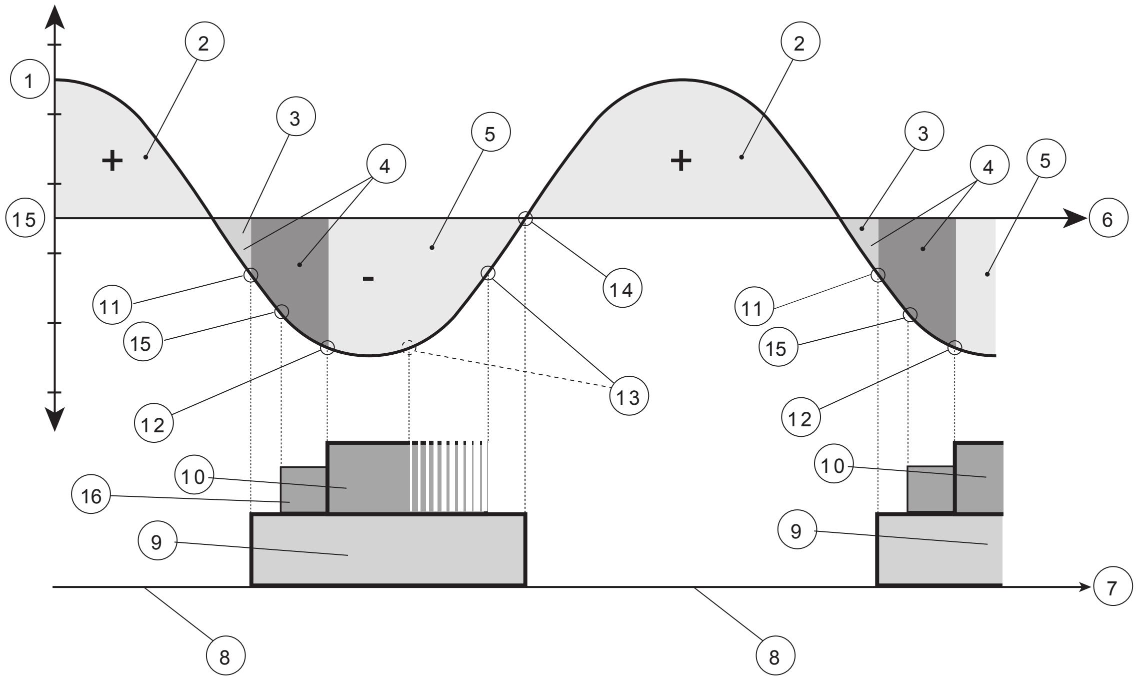


Figure 25. Starting and stopping heat pump operation based on integral values

Symbol explanation

1	Integral
2	Heat surplus
3	INTEGRAL A1
4	INTEGRAL A2
5	Heating deficit
6	Time
7	Heat pump operation
8	No operation
9	Compressor
10	Internal additional heater
11	Compressor start (A1)
12	Auxiliary heater start A2
13	Aux. heater stop (latest by A1)
14	Compressor stop (=0)

Symbol explanation

15	INTEGRAL A3
16	External auxiliary heater

The calculation of the integral value stops during heat stop. The calculation of the integral value stops when heat stop has stopped.

In this example INTEGRAL A3 < INTEGRAL A2. This means that the external addition will be activated earlier than the internal addition. On the condition that these are activated.

9.8 HYSTERESIS

In order to start the heat in advance during sudden changes of the heat demand, there is a value, HYSTERESIS, which controls the difference between the actual supply temperature, t_1 and the calculated supply temperature, t_2. If the difference is equal to or greater than the set HYSTERESIS value (x), i.e. there is a heat demand, or the heat demand disappears, quicker than the usual integral calculation, the integral value is forced to either the start value (-60) INTEGRAL A1 or to the stop value (0).

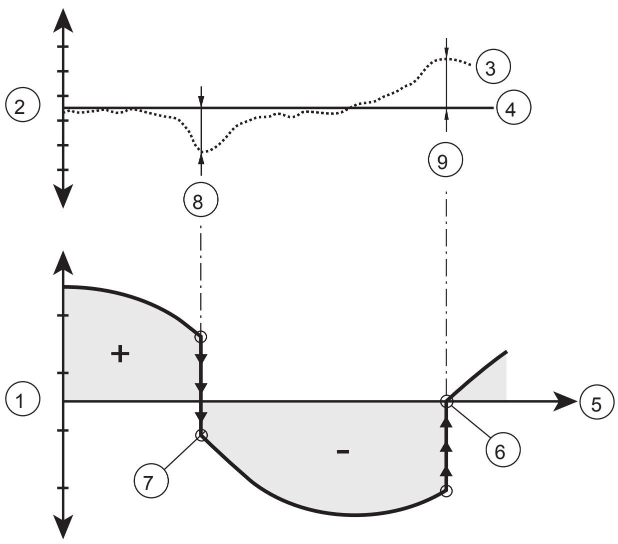


Figure 26. Conditions for HYSTERESIS to force the integral value to change.

Position	**Description**
1	Integral
2	Supply temperature
3	t_1
4	t_2
5	Time
6	Compressor stop (0)
7	Compressor start (-60)
8	Hysteresis (Δt) ≥ x
9	Hysteresis (Δt) ≥ x

9.9 DEFR CURVE

To start defrosting the outdoor unit for DHP A/DHP AL, the control computer makes a calculation using the temperature of the brine return and the outdoor temperature.

The calculation is based on a linear defrosting curve that can be set so that the heat pump and outdoor unit work optimally. The setting of three different values can be changed: DEFR CURVE 0, DEFR CURVE -20 and OUTDOOR STOP. The defrosting sequence starts when the temperature of the brine return reaches the set parameter value for the defrosting curve at an outdoor temperature somewhere along the defrosting curve.

The two parameters that are mainly changed are DEFR CURVE 0 and DEFR CURVE -20. The numbers behind the DEFR CURVE display what outdoor temperature the setting is for, that is to say at 0°C for DEFR CURVE 0 and -20°C for DEFR CURVE -20. The value -20 for DEFR CURVE -20 is the set value for OUTDOOR STOP, so if the value for OUTDOOR STOP changes, the numbers behind DEFR CURVE also change.

Factory setting for OUTDOOR STOP is -20°C. At this outdoor temperature, compressor operation is stopped and the additional heater takes over. Generally the value of OUTDOOR STOP does not need to be changed. Tests and operating cases have shown that -20°C operates very well as the stop temperature. In the text and figures below the value -20°C has been used for OUTDOOR STOP.

The display shows the value for DEFR CURVE 0 and DEFR CURVE -20 by means of a graph.

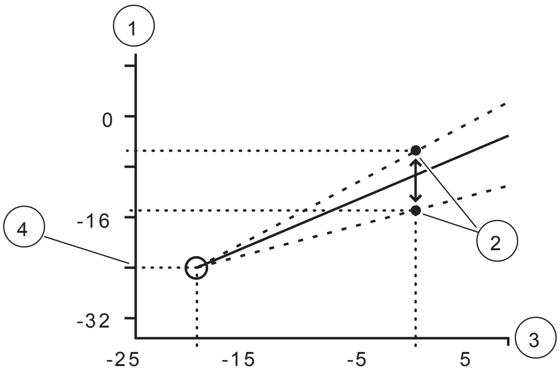


Figure 27. Graph that shows how the value for DEFR CURVE 0 can be set.

1. Temperature, input brine line
2. Adjustable interval for DEFR CURVE 0 is a brine return between -5°C and -15°C at 0°C outdoor temperature
3. Outdoor temperature
4. Set value for DEFR CURVE -20

The value for OUTDOOR STOP corresponds to the fact that the compressor will no longer be used for heating or hot water production if the outdoor temperature is the same as or lower than the value. Heating and hot water production will then be produced with the help of the auxiliary heater.

The value for DEFR CURVE 0 is the temperature that the brine return is permitted to reach when a defrost must start at outdoor temperature 0°C.

In the corresponding way the value for DEFR CURVE -20 is the temperature that the brine return has when a defrost should start at the set outdoor temperature for OUTDOOR STOP. The setting for DEFR CURVE –20 means that the value OUTDOOR STOP (-20°C) is reduced by between 1 and 8 degrees. This also determines how much lower the temperature for the brine return may be than -20°C in this case.

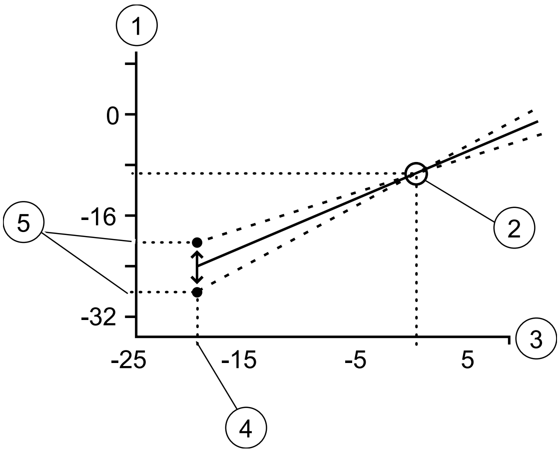


Figure 28. Graph that shows how the value for DEFR CURVE -20 can be set.

1. Temperature, input brine line
2. Set value for DEFR CURVE 0
3. Outdoor temperature
4. Set value for OUTDOOR STOP, -20°C

5. Adjustable value for DEFR CURVE -20 is 1°C to 8°C lower than OUTDOOR STOP

These three settings together create the defrosting curve and all three values have an effect on when defrosting will start, even if it is mainly DEFR CURVE 0 and DEFR CURVE -20 that is changed.

10 Troubleshooting

10.1 Alarm

In event of alarm this is indicated in the display with the text ALARM and an alarm message, see following table. For alarms that are not reset automatically acknowledgement is required. Acknowledge the alarm by setting the heat pump to operating mode OFF and then back to the desired operating mode.

Message	Meaning
HIGH PRESSURE ERROR	Tripped high pressure switch. Compressor stopped.
LOW PRESSURE ERROR	Tripped low pressure switch. Compressor stopped.
MOTOR P ERROR	Deployed overload relay (overcurrent relay) compressor, deployed overload relay for outdoor unit fan. On certain models alarms from the brine pump or soft starter can also occur. Compressor stopped.
BRINE OUT	Brine out is less than the set minimum temperature. Compressor stopped. No hot water production.
BRINEFLOW LOW	Flow sensor not active during last start. Compressor stopped. No hot water production.
AUX. HEATER	Overheating protection deployed. No auxiliary heater.
OUTDOOR SENSOR	Fault in outside sensor. When the control system calculates the heat demand, zero degrees is used.
SUPPLY LINE SENSOR	Supply line sensor error. Everything stops except the heating system's circulation pump.
RETURN LINE SENSOR	Return sensor fault. Return temperature = Supply line – 5 is used. Calculated supply temperature limited to maximum 45°C.
HOT WATER SENSOR	Fault on sensor for start temperature. No hot water production.
DEFROST SENSOR	Defrost sensor fault. Heating and hot water production is controlled from the outdoor sensor's value instead (applies to DHP-A, DHP-A Opti, DHP-AL, DHP-AL Opti).
SENSOR COOLING	Sensor fault. Cooling function stops.
ERR PHASE SEQ.	Alarm that indicates that there is an incorrect phase sequence to the compressor. Only display and only the first 10 minutes.
HIGH RETURN	Alarm that indicates that high return temperature prevents the compressor's operation.

In event of alarm the heat pump will if possible supply heating to the house, primarily with the compressor, secondarily with the additional heater. Hot water will stop to indicate that something noteworthy has occurred.

10.2 Measurement points

1. Disconnect the relevant sensor from I/O-card/terminal block.
2. Measure the resistance for the sensor and any extension cables.
3. Then measure the sensor only.

Caution! When reading the resistance of the sensors, the sensor leads must first be disconnected from the control equipment.

Note! To ensure the sensor value the actual temperature must be checked against the measured resistance.

10.2.1 Measurement checking sensors during fault tracing

Table 8. Outdoor sensor / Defrost sensor

°C	ohm, Ω
-30	1884
-25	1443
-20	1115
-15	868
-10	681
-5	538
0	428
5	343
10	276
15	224
20	183
25	150
30	124
35	103
40	86

Table 9. other sensors

°C	kilo ohm, kΩ
0	66,3
5	52,4
10	41,8
15	33,5
20	27,1
25	22,0
30	18,0
35	14,8
40	12,2
45	10,1
50	8,5
55	7,1
60	6,0
65	5,0
70	4,2
75	3,7
80	3,1
85	2,7

10.3 Check points

Table 10. Temperatures

Name	Values
Condensing temperature	0.5 – 1.5 °C above supply line temperature
Evaporation temperature	7 - 8 °C lower than incoming brine
Superheating	4 - 8 K temperature difference
Radiator circuit	5 - 10 K temperature difference
Brine circuit	2 - 5 K temperature difference
Overheating R407C	4K ±1 K

Table 11. Expansion valve factory setting

Name	Setting
Danfoss TUBE R404A, 4.2 kW	From fully closed position, screw 3 turns out
Danfoss TUBE R404A, 5.6 kW	From fully closed position, screw 5,5 turns out
Danfoss TUBE R404A, 8,4 kW	From fully closed position, screw 5 turns out
Danfoss TUBE R404A, 12.0 kW	From fully closed position, screw 5.25 turns out
Danfoss TUBE R404A, 15.3 kW	From fully closed position, screw 2.75 turns out

Name	Setting
Danfoss TUBE R407C, 11.0 kW	From fully closed position, screw 6.25 turns out
Danfoss TUBE R407C, 17,0 kW	From fully closed position, screw 5,5 turns out

Table 12. Break pressure switches

Refrigerant	Pressure switch	Break pressure
R134a (Only applies to certain models of DHP-C)	Low pressure switch	0.03 MPa
	Operating pressure switch	1.80 MPa
	High pressure switch	2.45 MPa
R404A (Only applies to DHP-A, DHP-AL)	Low pressure switch	0.08 MPa
	Operating pressure switch A	2.65 MPa
	Operating pressure switch B	2.85 MPa
	High pressure switch	3,10 MPa
R407C	Low pressure switch	0.08 MPa
	Operating pressure switch	2.85 MPa
	High pressure switch	3,10 MPa

10.4 Operational problems

The tables in the following section apply to all types of heat pump and collector solutions.

The tables list the most probable and common causes of the problem first. When troubleshooting the cause of a problem start with the first cause and go down the list. There may be more than one way of troubleshooting a cause where the most probable is given first.

10.4.1 Alarm

Table 13. Problem – Alarm LP (low pressure switch)

Cause	Troubleshooting	Remedy
1. Blocked strainer on the brine circuit.	Check that the strainer is not blocked.	Clean the strainer if necessary.
2. Air in the brine circuit.	Listen for air in the heat pump and brine circuit.	Bleed the brine circuit according to the installation instructions.
3. Closed taps, main tap or filler cock on the brine circuit.	Check that the shut-off cock or any other taps are open.	Open closed taps.
4. The circulation pump for the brine circuit is defective or has jammed.	Check: • That the circulation pump spins. • That the shut-off valves are open. • That the strainer is not blocked. • That there is no air in the heating system.	The circulation pump may have jammed. If so, open the bleed screw and try to release the paddle wheel using a screwdriver for example. Open closed valves or taps. Check, and, if necessary, clean the strainer. If necessary, bleed the heating system according to the installation instructions
5. Cable break or loose cable to low pressure switch.	• Check that both cables are connected to the pressure switch. • Using the buzzer, check that there are no cable breaks. In order to do this, disconnect the cables from the pressure switch and circuit board.	If a cable has come loose, reconnect it. If there is a cable break, replace the cable.

Cause	Troubleshooting	Remedy
6. The low pressure switch opens too soon.	• Incorrect pressure switch installed. Higher break pressure than intended. See marking. • Pressure switch fault, opens at a higher pressure than indicated (mark pressure). Check using the manometer apparatus. • Defective pressure switch, always open.	If the low pressure switch opens too soon or is always open, replace it.
7. Incorrect type of anti-freeze, must be in accordance with instructions.	Check that the correct type of anti-freeze is used.	If the incorrect type of anti-freeze is used, the entire system must be drained and refilled with a new mixture.
8. Incorrect mix of anti-freeze, the concentration must be in accordance with instructions.	Check the freezing point of the mix using a refractometer.	If the mixture is not in accordance with the instructions, it must be remixed in an external container. This is because the fluids do not mix with each other well if one is filled directly into the system.
9. Short active collector, e.g. short or dry bore hole, short surface soil collector.	• Check the length of the collector that is being used and compare with the collector length in the dimensioning documentation. • In addition, check that the collector is not suspended "in free air" if boreholes are used.	If the active collector is too short, the heat pump cannot receive enough energy from the heat source , which results in it requiring an addition to cover the energy requirement.
10. Collector too long, pressure drop too great.	Check the length of the collector that is being used and that it is connected in parallel (not connected in series) if more than 1 coil is being used.	If a longer collector is being used than recommended for the specific heat pump, it must be divided on several parallel connected coils.
11. Expansion valve defective or incorrectly set.	• Using manometer apparatus and thermometer check what the overheating reading of the unit is. • Also check that bulb and capillary tube are undamaged and that the bulb is correctly installed.	If the overheating reading does not correspond with the instructions for the specific refrigerant, adjust the expansion valve until the correct value is obtained. See separate instructions for cooling techniques. If overheating cannot be adjusted with the expansion valve or if the capillary tube/bulb is damaged, replace it.
12. Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action.
13. Drying filter blockage.	Check the temperature difference above the drying filter. A one degree difference is permissible. If the difference is greater than 1 degree, the filter is blocked. Take a reading during operation.	If the drying filter is sealed, replace it.

Cause	Troubleshooting	Remedy
14. Blocked evaporator on the water side.	If there is no strainer in the brine circuit, there is a risk of dirt sticking in the evaporator and blocking it. Unfortunately there is no easy way of checking if the evaporator is blocked. You can carry out a test by allowing the compressor and circulation pumps to remain in operation. Check that the circulation pumps work (for circ.pumps with a bleed screw, unscrew it and feel if the pump rotor rotates using a screwdriver). Then read the temperature on both connection pipes to the evaporator: If the temperature difference is <1°C, the evaporator is probably blocked. If the temperature difference is 2-6°C, it is probably not blocked. If the temperature difference is >6°C, the evaporator is probably blocked.	If the evaporator is thought to be blocked, try flushing it. If this does not work, it must be replaced
15. Blocked evaporator on the refrigerant side.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	If the evaporator is thought to be blocked by oil for example, try blowing nitrogen through it to release the oil. If this does not work, it must be replaced

Table 14. Problem – Alarm HP (high pressure switch)

Cause	Troubleshooting	Remedy
1. Blocked strainer in the heating system.	Check that the strainer is not blocked.	Clean the strainer if necessary.
2. Air in the heating system.	Listen for air in the heat pump and heating system.	Bleed the heating system according to the installation instructions.
3. Closed or partially closed thermostats/valves in the heating system.	Check that the thermostats/valves in the heating system are open.	Open closed thermostats/valves.
4. The circulation pump that is defective or has jammed.	Is there voltage to the circulation pump?	In the control system's manual test menu check that the circulation pump is active. Check if there is voltage to the circulation pump, if there is, and it does not run, the circulation pump is jammed. If this is the case, open the bleed screw and try to release the paddle wheel using a screwdriver for example (Does not apply to heat pumps in the Opti). If there is no voltage to the circulation pump, check if there is voltage from the I/O card, see wiring diagram. If there is voltage from the I/O card, check the components between the I/O card and the circulation pump. If a component is defective, replace it.
5. Shut-off main tap in heating system.	Check that the main tap is open.	Open closed main tap.
6. Cable break or loose cable to high pressure switch.	• Check that both cables are connected to the pressure switch. • Using the buzzer, check that there are no cable breaks. In order to do this, disconnect the cables from the pressure switch and circuit board.	If a cable has come loose, reconnect it. If there is a cable break, replace the cable.

Cause	Troubleshooting	Remedy
7. The high pressure switch does not open.	• Incorrect pressure switch installed. Same or higher break pressure than the high pressure switch. See marking. • Pressure switch fault, opens at a higher pressure than indicated (mark pressure). Check using the manometer apparatus. • Defective pressure switch, never opens.	If the high pressure switch does not open, replace it.
8. The high pressure switch opens too soon.	• Incorrect pressure switch installed. As low or lower break pressure than operating pressure switch. See marking. • Pressure switch fault, opens at a lower pressure than indicated (mark pressure). Check using the manometer apparatus. • Defective pressure switch, always open.	If the high pressure switch opens too soon or is always open, replace it.
9. External system shunt that closes on time setting.	Check for shunts or valves in the system, which are timer-controlled, that close down the entire or too large a part of the heating system.	Always ensure that there is a sufficiently large water volume for the heat pump to work against, i.e. for the heat to give off its heat to.
10. Incorrectly facing non-return valve with too high opening pressure.	• Check the system's direction of flow and that the non-return valve is turned the correct way. • Check that the heat pump's external available pressure exceeds the non-return valve's opening pressure.	If the non-return valve is facing the wrong way, turn it. If the non-return valve has too great an opening pressure, replace it.
11. Large pressure drop in the heating system.	• Dirt in the heating system. • Closed or partially closed thermostats/valves in the heating system. • Under dimensioned pipe system. Check that the HP's external available pressure exceeds the system pressure drop.	If necessary, clean/flush the heating system. Open closed thermostats/valves. If there is not sufficient pressure equipment, the heating system can be adjusted according to the system solution for large pressure drop.
12. Overfilled refrigerant circuit.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action.

Cause	Troubleshooting	Remedy
13. Blocked condenser on the water side.	If there is no strainer in the heating system, there is a risk of dirt sticking in the condenser and blocking it. Unfortunately there is no easy way of checking if the condenser is blocked. You can carry out a test by allowing the compressor and circulation pumps to remain in operation and after a while, check that the pressure pipe becomes hot and that the circulation pumps work (for circ.pumps with a bleed screw, unscrew it and feel if the pump rotor rotates using a screwdriver). Then read the temperature on both connection pipes to the condenser: If the temperature difference is <3°C, the condenser is probably blocked. If the temperature difference is 3-13°C, it is probably not blocked. If the temperature difference is >13°C, the condenser is probably blocked.	If the condenser is thought to be blocked, try flushing it. If this does not work, it must be replaced
14. Blocked condenser on the refrigerant side.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	If the condenser is thought to be blocked by oil for example, try blowing nitrogen through it to release the oil. If this does not work, it must be replaced

Table 15. Problem – Alarm MS (motor protection)

Cause	Troubleshooting	Remedy
1. Phase drop or blown fuse.	Check that all phases are present on the terminal block for incoming supply. If not, check the fuses in the cabinet. Also check that all wiring is secure, if screw terminals are used they must be properly tightened, if phoenix flat spring terminals are used, the cables must be secure in the correct hole with load on the cable.	If any of the phases are missing, check backwards towards the building's main electrical cabinet. If there are no phases there, contact the network supplier.
2. Defective soft-starter (three-phase heat pump).	Measurement check and establish that when the I/O card gives a signal (there must be voltage between A1 & A2 on the soft-starter), the soft-starter releases all three phases down to the compressor.	If the soft-starter does not release the phases when it receives signals from the I/O card, replace it.
3. Defective soft-starter (single phase heat pump).	Check measure and establish that when the I/O card gives a signal (there must be voltage between ON and N on the soft-starter), the soft-starter releases the phases to the compressor.	If the soft-starter does not release the phases when it receives signals from the I/O card and does not alarm as below, replace it.
4. Defective or incorrectly set motor protection.	Use a hook-on meter to establish when the motor protection deploys, check what the motor protection is set to. Compare with the table. For three phase heat pumps all three phases must be supplied.	If the motor protection is defective, replace it. If incorrectly set, adjust to the correct value.
5. Cable break.	Check the supply to the motor protection, soft-starter or compressor.	If a cable is damaged, replace it.

Cause	Troubleshooting	Remedy
6. Defective compressor (applies to 3-phase heat pumps).	Measurement check the voltage on the three phases (each to zero) at the compressor. There must not be any large deviation between the phases. If measurement checking the winding's resistance the same value must be on all three windings.	If the compressor is defective, replace it.
7. Alarm from the overload protection on the brine pump (only certain heat pump models).	Switch the heat pump off and on. If the alarm remains check the WSK switch in the brine pump.	If the brine pump is defective, replace it.
8. Alarm from single phase soft starter.	Check the fault cause using the soft start LEDs.	

Table 16. Problem – Alarm sensor (all)

Cause	Troubleshooting	Remedy
Sensor fault alternatively cable fault.	• When reading the resistance of the sensors, the sensor leads must first be disconnected from the control equipment or terminal block. • First take a reading from the sensor including cable and check against the ohm table in Measurement points. • If the read off value does not correspond with the table, only measure the sensor and check the ohm table in Measurement points.	If the sensor gives a correct value, the cable is defective. If the sensor does not give a correct value, the sensor is defective.

Table 17. Problem – Incorrect phase sequence

Cause	Troubleshooting	Remedy
The incoming phases have the incorrect sequence (only applies to 3-phase heat pumps).	• If the text ERR PHASE SEQ. appears in the display when the heat pump is powered, (only appears in the first 10 minutes) this means that the phases have the incorrect sequence. • When the compressor is running, check the pressure pipe temperature by feeling the pressure pipe. If the phases are correctly sequenced it should be hot (not just warm) even a distance from the compressor. • When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling) when the compressor runs backwards.	If the phases are in the incorrect order, switch two incoming phases at the main terminal block and recheck according to the troubleshooting window.

Table 18. Problem – Alarm AH (auxiliary heat)

Cause	Troubleshooting	Remedy
1. The overheating protection has tripped.	Check if the overheating protection has tripped.	If the overheating protection has tripped, reset it.
2. Phase drop. The alarm occurs when 230 V is not registered between L2 on the circuit board and N.	• Check if the overheating protection has tripped. • Check if any cables at the circuit board or overheating protection are loose or damaged.	If the overheating protection has tripped, reset it. If the cables are loose or damaged, secure or replace them.
3. Overheating protection fault, cannot be reset.	Press the reset button, measurement check for 230 V on the incoming and outgoing connections.	If the overheating protection is defective, replace it.
4. Flow sensor fault.	Check what the flow sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.
5. No or insufficient circulation in the heating system.	Check: • That the circulation pump spins • That the shut-off valves are open. • That the strainer is not blocked. • That there is no air in the heating system.	The circulation pump may have jammed. If so, open the bleed screw and try to release the paddle wheel using a screwdriver for example. Open closed valves or taps. Check, and, if necessary, clean the strainer. If necessary, bleed the heating system according to the installation instructions
6. The submersible tube in the electric heating element is against the coils.	Check what the flow temperature is when the overheating protection trips. This normally trips at 95°C.	The submersible tube can be prised out slightly from the coils using a screwdriver or similar. The submersible tube must be vertical.

Table 19. Problem – Alarm Brine out

Cause	Troubleshooting	Remedy
1. Defective sensor.	Check what the sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.
2. Brine temperature too low.	Check the set value on ALARM BRINE in the heat pump's control computer.	The alarm is triggered when the temperature on BRINE OUT is as low or lower than the set value on ALARM BRINE. In the factory setting this function is inactive.

Table 20. Problem – Alarm Brine flow low

Cause	Troubleshooting	Remedy
1. Incorrect system selected in the control system. If the system does not contain a flow sensor but the control system is set for the system with flow sensor, this alarm occurs.	In the menu SYSTEM, check which system is selected.	If the incorrect system is selected, change it.
2. Insufficient flow.	• Check whether the ground water pump is running. • Check the flow sensor. • Calibration/setting the flow sensor. • Blocked exchanger?	The ground water pump must start and run together with the heat pump's integrated brine pump. Check against the wiring diagram that the flow switch is correctly connected. Check that the flow switch is set for the correct working range according to the flow switch instructions. If the exchanger is blocked, clean or replace it.

Table 21. Problem – Alarm brine pump

Cause	Troubleshooting	Remedy
The brine pump's integrated alarm has deployed. (Only applies Opti)	• Air in the brine pump? • Has the brine pump jammed?	Bleed the brine circuit according to the installation instructions. If the brine pump has jammed, there is an integrated shake function that attempts to shake itself loose up to a maximum of 5 times, if it does not manage this, an alarm will occur. Try cutting the voltage to the heat pump to stop the alarm and then manually run the brine pump. If the alarm recurs, repeat the procedure several times. If this does not help, replace the brine pump.

Table 22. Problem – Alarm circulation pump

Cause	Troubleshooting	Remedy
The circulation pump's integrated alarm has deployed. (Only applies Opti)	• Air in the circulation pump? • Has the circulation pump jammed?	Air in the brine circuit. See the installation instructions for information on how to perform filling. If the circulation pump has jammed, there is an integrated shake function that attempts to shake itself loose up to a maximum of 5 times, if it does not succeed, an alarm will occur. Try cutting the voltage to the heat pump to stop the alarm and then manually run the circulation pump. If the alarm recurs, repeat the procedure several times. If this does not help, replace the circulation pump.

Table 23. Problem – Operating pressure switch open alternatively high hot gas temperature

Cause	Troubleshooting	Remedy
1. Operating pressure switch, function.	1. Switch off the main switch for the heat pump, wait until the compressor has been stationary for at least 15 minutes. 2. Disconnect the two cables on the pressure switch, using a buzzer check if the pressure switch is closed.	If the pressure switch is closed, bridge the pressure switch cables temporarily and switch on the voltage to the heat pump again. If there is an indication 0 (zero) in the display this means that the pressure switch is fault-free and the problem is in the wiring or in the circuit board. If the pressure switch is open, try carefully tapping the head of the pressure switch with a screwdriver and use a buzzer test to see if it has closed again. Replace the pressure switch if it appears to jam repeatedly.
2. Sensor fault.	Check what the sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.
3. Hot gas temperature too high.	Check the set value on PRESS. PIPE in the heat pump's control computer (factory setting 140℃)	The square symbol appears when the delivery pipe temperature is as high or greater than the set value for DELIVERY PIPE.
4. Overheating too high.	Using manometer apparatus and thermometer check what the overheating reading of the unit is. Also check that bulb and capillary tube are undamaged and that the bulb is correctly installed.	If the overheating reading does not correspond with the instructions for the specific refrigerant, adjust the expansion valve until the correct value is obtained. See separate instructions for cooling techniques. If overheating cannot be adjusted with the expansion valve or if the capillary tube/bulb is damaged, replace it.
5. Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.

10.4.2 Leakage

Table 24. Problem – Leak fluid side

Cause	Troubleshooting	Remedy
1. Insufficiently tightened connections.	Locate the leak.	• Tighten the connection and check that it is sealed. • If it is still not sealed, replace the entire connection and support sleeve (only at soft pipes).
2. Cracked nut or connection.	Locate the leak.	Replace nut or connection.
3. Defective gasket or O-ring.	Locate the leak.	Replace the gasket or O-ring.

Cause	Troubleshooting	Remedy
4. There is no overflow pipe connected to the safety valve(s).	Establish which safety valve does not have an overflow pipe.	Install an overflow pipe according to the applicable norms.
5. Filler valve between incoming cold water and heating system not closed or leaking.	Check whether water continuously leaks from the safety valve on the expansion vessel on the hot side.	Try closing the filler valve and see if water stops dripping from the safety valve. If not, replace the filler valve.
6. No condensation drain to heat pump's drip tray.	Check that condensation drain is installed and correctly connected.	Install the condensation drain that runs out into the floor drain.
7. Lack of condensation insulation on cold water pipe and/or brine pipe.	Establish where the condensation is coming from.	The brine pipe must always be insulated. In the event of problems with condensation on the cold water pipes, insulate them. Condensation often accumulates in joints and angled sections of the insulation. Improve the insulation.
8. Leak at soldered joints.	Locate the leak.	Drain the system of fluid, repair the leak. If the leak is on the connection pipe to the heat exchanger, also drain the refrigerant side.
9. Leak at the condenser's drain cock.	1. Check that the valve is completely closed. 2. Check that the sealed cover is sealed.	If the sealed cover is not sealed, replace the sealed cover or the entire drain tap.
10. Leak at the condenser's bleed valve.	Check that it is completely closed.	If it is fully closed and still leaks, replace it.
11. Leak at soldered joint on water heater.	Locate the leak.	If there is a leak at the soldered joint, replace the water heater.
12. Associated leak on the water heater.	• Establish whether water continuously leaks from the safety valve on the expansion vessel on the hot side. • Establish whether water continuously leaks from the safety valve on the cold side.	If the water heater has a leak, replace it.
13. Associated leakage in the condenser.	• Check for lack of refrigerant in the unit. • Check by smelling at the safety valve on the hot side, open the valve and check.	If the condenser has a leak, replace it.
14. Anti-freeze is forced out of the safety valve on the expansion tank (brine system).	During the winter, water surrounding the hoses in the borehole can freeze. In some cases, the ice can push against the hoses slightly. Due to the reduction in volume in the hose, the anti-freeze fills the expansion tank and eventually forces some fluid out of the safety valve. When the ice in the borehole melts and the hose expands and returns to its original state, a vacuum is generated which results in a reduction in tank level. As the safety valve does not let any air in, the expansion tank can retract inwards due to the vacuum created.	To prevent anti-freeze from being forced out from the safety valve, you can exchange the existing expansion tank for a closed pressure expansion vessel with a greater volume. To prevent the expansion tank retracting inwards, a vacuum valve can be installed in the system.

10.4.3 Noise

Table 25. Problem – Noise problem in the radiator system

Cause	Troubleshooting	Remedy
1. Flexible hoses missing.	Flexible hoses must be installed according to the instructions.	Install flexible hoses according to the instructions.
2. Incorrectly installed flexible hoses.	Flexible hoses must be installed according to the instructions.	Install flexible hoses according to the instructions.
3. Installing/suspending pipes.	Check if the mountings are too rigid, right type, right sizes and/or installed too close together.	If something seems to be incorrect according to the troubleshooting window, carry out corrective actions.
4. Clicking.	• Establish when clicking occurs, during heating and/or in connection with completed hot water production? • Locate the clicking noises.	A surge tank can be installed on the supply line to mix the hot water with the existing, slightly cooler, water, before it goes out to the radiators. Try lubricating lead-ins in walls, ceilings and floors with silicone spray.
5. Circulation noise (whistling noise in the heating system).	Check the heating system. • Closed valves, choke valves, adjuster valves or other restrictions in the radiator system can cause circulation noise. • Is the heating system correctly adjusted for flow? • Too great a flow in the heating system can cause circulation noise.	If the incorrect type of valve is used to choke the flow, replace with the correct type. If the heating system is not correctly adjusted, make adjustments. Can the heating system be run at a lower flow?

Table 26. Problem – Loud compressor noise

Cause	Troubleshooting	Remedy
1. Phase drop. The compressor attempts to start or operates on two phases (only applies to 3 phase heat pumps) .	1. Check that there is 400 V between incoming phases on the heat pump. 2. If there is supply to the heat pump, measure the voltage for all electrical components all the way to the compressor, see wiring diagram.	Check where the phase drop is and rectify.
2. Touching pipes – vibrations.	Establish which pipe(s) is/are causing the problem.	Try to release any tensions that cause the vibrations.
3. Compressor fault.	Determine whether the compressor is unusually loud.	If the compressor is defective, replace it.

Table 27. Problem – Shrieking, whistling noise

Cause	Troubleshooting	Remedy
1. Whistling expansion valve.	1. Take overheating readings, adjust to the recommended value. 2. Open and close the valve fully in and out. 3. Adjust the expansion valve to recommended overheating value again.	Check if the noise has stopped. If not, continue with point 2. Continue with point 3. If the problem persists, replace the expansion valve.
2. Noise from the soft-starter.	Measurement check the input and output phases for the soft-starter as well as the control signals from the I/O card (see wiring diagram).	If the soft-starter is defective, replace it.
3. The compressor's IPR valve opens.	The compressor has an integrated IPR valve that opens at 28 ±3 bar. When the valve opens, pressure equalizes between the compressor's high and low pressure sides and a milling/whistling sound is heard. To establish whether the valve opens at the correct pressure, connect a manometer on the high and low pressure sides. When the valve opens, this is indicated by the pressure on the low pressure side rising and reaching the pressure on the high pressure side. Check at what pressure the valve starts to open.	If it opens at too low a pressure, replace the compressor.

Table 28. Problem – Noise – miscellaneous

Cause	Troubleshooting	Remedy
1. Vibrating protective sleeves on the pressure switches.	Establish where the vibration noise is coming from.	Prevent the protection sleeve vibrating by using insulation tape for example.
2. Vibration noise from the electrical installation.	Check for electrical steps or similar devices screwed to the heat pump and wall. These can cause vibrations and noise.	Carry out according to the installation instructions.
3. The heat pump is not level.	Check that the heat pump is level by using a spirit level. Check that the heat pump is supported by all four feet.	If the heat pump is not level, adjust using the feet.
4. General noise problems	Carry out preventative measures. See *Installation instructions.*	Example: • Improve the acoustic environment in the area where the heat pump in located by installing acoustic panels on the walls and ceiling. • Install a hood on the compressor (most effective for high frequencies).

10.4.4 Hot-water

Table 29. Problem – Temperature and/or quantity

Cause	Troubleshooting	Remedy
1. Defective 3-way valve motor.	Check the function of the 3-way valve, that it runs between the end positions by running a manual test.	If the motor is defective, replace it.
2. Jammed 3-way valve insert. The valve is not secure and releases hot water to the radiators during hot water production.	Detach the motor and test closing and opening of the valve by pressing the control arm	If the insert jams, remove and clean it, or replace it.
3. Air in TWS coil or water outer jacket.	During hot water production: • Listen for air. • Check the temperature difference between supply and return line.	Bleed the system. A Large temperature difference can indicate air in the system.
4. Start temperature set too high for hot water production.	Check that the start temperature is correctly set. Should not be set above the factory set value.	• If the start value is set too high, reduce it to the factory set value. • If the system has a high (>+8°C) brine temperature, you may have to reduce the start value further for a longer running time.
5. Sensor fault, hot water sensor. Hot water production is started by the hot water sensor.	Check what the hot water sensor (the start sensor) shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.
6. Large drain flow (>12l/min).	Check how many litres of hot water (approx. 40°C) per minute drains from the tap. Use a clock and bucket to measure the drain flow.	If the drain water flow is greater than 12l/min, stratification in the water heater is affected, which reduces the hot water capacity. Suggested corrective actions: • Install a pressure reduction valve on the incoming cold water pipe. • Change to a mixer with lower flow. • Adjust the drain flow on the existing mixer, do not open the tap fully.
7. Water heater too small in relation to requirement.	How large is the requirement and what is the capacity of the heater?	Replace with a larger heater or supplement with an extra heater. E.g. supplement with an DWH or an electric heater.
8. The operating pressure switch opens too soon (at too low a pressure). Hot water production ends when the operating pressure switch opens.	Check the break pressure using manometer apparatus.	If the pressure switch opens at the incorrect pressure, replace it. The replacement pressure switch can be installed on the service output (Schrader valve).

Cause	Troubleshooting	Remedy
9. Insufficient exchange surface to transfer the heat pump's output to the heater. (Only applies to heat pumps with a separate heater.)	Is the exchange surface too small? Can the heater cope with the heat pump's output?	Replace with a heater with a larger exchange surface.
10. Heat loss in the hot water pipe.	Open the hot water tap, read off the temperature on the outgoing hot water pipe from the heat pump and the temperature of the hot water. The temperature difference measured between the heat pump and hot water indicates the temperature loss. Examples of temperature loss causes: • Long water pipes. • Uninsulated hot water pipes. • Hot water pipes routed through cold areas. Other causes that can affect the hot water temperature: • Is a mixer valve installed in the system? Temperature set too low on the mixer valve? Leaking mixer valve? • Water tap fault? Leaking thermostat mixer?	If any problems occur during troubleshooting as per the points, carry out corrective actions. To quickly check that the heat pump's hot water production works as it should, drain the hot water so that the heat pump starts to produce the hot water. When done, read off the temperature on the top sensor and on the start sensor. The top sensor should show a temperature of around 50-55°C and the start sensor around 45-48°C. If, after completed hot water production, these temperatures are obtained, this means that you have the correct temperature and volume of hot water in the water heater.

10.4.5 Heating comfort

Table 30. Problem – Too cold

Cause	Troubleshooting	Remedy
1. The heat pump's control computer is not set/adjusted to the customer's requirements/wishes.	Check the ROOM and CURVE and MAX settings.	Adjust incorrect values in the heat pump's control computer. ROOM = Desired indoor temperature CURVE = Should be set so that the desired indoor temperature (ROOM) is maintained regardless of the outdoor temperature. MAX = Highest set-point value on the supply line regardless of the outdoor temperature.
2. Incorrect operating mode set in the heat pump's control computer.	Check which operating mode is set.	If the incorrect operating mode is set, change to the desired operating mode.
3. Sensor fault, OUTDOOR/ROOM/SUPPLY LINE/RETURN LINE.	Check what the relevant sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.

Cause	Troubleshooting	Remedy
4. The 3-way valve has jammed in hot water mode.	1. Check the function of the 3-way valve motor by test running it manually. If the motor does not shift mode during manual test operation, check that there is voltage to the motor, see wiring diagram. 2. Detach the motor and test closing and opening of the valve by pressing the control arm.	1. Is the motor being supplied with voltage according to the wiring diagram in both operating instances? MANUAL TEST – REV.V. HOT WATER 0=Radiator mode, arm out from valve. 1=Hot water mode, arm positioned towards the valve. If there is voltage to the motor but the arm does not shift mode, replace it. 2. Take out and clean the jammed insert, or replace with a new insert.
5. Defective electric heating element.	Use a buzzer and check if all coils in the electric heating element are intact.	If the electric heating element is defective, replace it.
6. The heat pump has stopped on HIGH RETURN.	• Check what the MAX RETURN value is set at in the heat pump's control computer. It must be adjusted to the unit's maximum supply temperature and the system's delta temperature so that it does not cut at too high a return temperature when the highest supply temperature is transmitted. • Check what the return line sensor shows. Is it a plausible/actual value? If not, take a resistance reading from the sensors and check against the ohm table in the Measurement points section 19.3.	If the MAX RETURN value is not adjusted for the system according to the troubleshooting window, adjust it. If the sensor is defective, replace it.
7. Heat production is stopped by the HYSTERESIS function.	If the flow temperature rises as soon as heat production is stopped by HYSTERESIS before INTEGRAL reaches 0, there may be heating deficit in the house. • Check if heat production stops because the hysteresis value is set too low? (See the installation instructions for factory setting.) • Check if heat production stops because thermostats/valves in the heating system are closed or partially closed? • Check if heat production stops because the heating system is under dimensioned?	• Try increasing the hysteresis value until the heat pump stops on INTEGRAL instead. • Open thermostats/valves in the heating system and check that the heat pump stops on INTEGRAL. • If the heating system is deemed to be under dimensioned, the system must be extended (the heat emitting surface increased).
8. The auxiliary heater is not permitted to cut in with sufficient output. Value set too low on MAXSTEP. MAXSTEP 1 = 3 kW MAXSTEP 2 = 6 kW MAXSTEP 3 = 9 kW MAX STEP 4 = 12 kW (only DHP A) MAX STEP 5 = 15 kW (only DHP A) MAX STEP +4 = 12 kW (only DHP A) MAX STEP +5 = 15 kW (only DHP A)	Check the set value on MAXSTEP in the heat pump's control computer.	If necessary, adjust the MAXSTEP value in the heat pump's control computer. MAXSTEP 1 = 3 kW MAXSTEP 2 = 6 kW MAXSTEP 3 = 9 kW MAX STEP 4 = 12 kW (only DHP A, cannot cut in when the compressor is running.) MAX STEP 5 = 15 kW (only DHP A, cannot cut in when the compressor is running.) MAX STEP +4 = 12 kW (only DHP A, can cut in when the compressor is running.) MAX STEP +5 = 15 kW (only DHP A, can cut in when the compressor is running.)

Cause	Troubleshooting	Remedy
9. The external auxiliary heater does not start when the heat pump's control computer requests it.	If an external auxiliary heater is used, check that it is correctly installed by test running it in MANUAL TEST – AUX. HEATER - 1. If it does not start at manual test operation, check that the start signal/voltage comes from the heat pump. See wiring diagram.	Connect the external auxiliary heater according to the instructions. Measure the voltage on the I/O card's probe L2 Oil/Electricity.
10. Closed or partially closed thermostats/valves in the heating system.	Check that the thermostats/valves in the heating system are open.	Open closed thermostats/valves.
11. The total output of the heat pump and auxiliary heater is too low in relation to the building's power demand.	What is the building's power demand? What is the output of the heat pump? What is the output of the auxiliary heater, what is it set to?	Ensure that available power is at least as great as the building's power demand.
12. Under dimensioned heating system.	Check existing heating system. What output is it dimensioned for to produce at what supply temperature? What output is required to keep the room warm?	If the heating system is dimensioned for greater supply temperatures than the heat pump can provide, it must be adjusted by increasing the heat emitting surface for example. If the room requires a higher output than the heating system can provide, extend the heating system.
13. Changed conditions Have you increased your heating and/or hot water demand?	• If the heat pump has been dimensioned for a certain demand and this demand is increased, the heat pump might not be able to maintain the desired room temperature. • If hot water consumption increases, a larger proportion of time is used to produce hot water, which means less time for heat production (only applies to system solution 1).	If the heat pump cannot cope with the demand, replace it with one with a higher output or supplement it with a higher output auxiliary heater.

Table 31. Problem – Too hot

Cause	Troubleshooting	Remedy
1. The heat pump's control computer is not set/adjusted to the customer's requirements/wishes.	Check the ROOM and CURVE and MIN settings.	Adjust incorrect values in the heat pump's control computer. ROOM = Desired indoor temperature. CURVE = Should be set so that the desired indoor temperature (ROOM) is maintained regardless of the outdoor temperature. MIN = Lowest set-point value on the supply line regardless of the outdoor temperature.
2. Sensor fault, OUTDOOR/ROOM/SUPPLY LINE.	Check what the relevant sensor shows. Is it a plausible/actual value? Measure the resistance of the sensor, check against the ohm table in Measurement points.	If the sensor is defective, replace it.

Cause	Troubleshooting	Remedy
3. Defective 3-way valve motor. The motor should set the valve to the relevant end position depending on operating conditions. If it does not, hot water from the water heater will mix with the radiator water.	Check the function of the 3-way valve motor by test running it manually. If the motor does not shift mode during manual test operation, check that there is voltage to the motor, see wiring diagram.	Is the motor being supplied with voltage according to the wiring diagram in both operating instances? MANUAL TEST – REV.V. HOT WATER 0=Radiator mode, arm out from the valve. 1=Hot water mode, arm positioned towards the valve. If there is voltage to the motor but the arm does not shift mode, replace it.
4. Jammed 3-way valve insert. If the insert is not sealed, hot water from the water heater will mix with the radiator water.	Detach the motor and test closing and opening of the valve by pressing the control arm.	Take out and clean the jammed insert, or replace with a new insert.

Table 32. Problem – Irregular indoor temperature

Cause	Troubleshooting	Remedy
1. The heat pump's control computer is not set/adjusted to the customer's requirements/wishes.	Check the ROOM and CURVE, MIN, MAX CURVE5, CURVE0, CURVE-5 and HEAT STOP settings.	Adjust incorrect values in the heat pump's control computer. ROOM = Desired indoor temperature CURVE = Should be set so that the desired indoor temperature (ROOM) is maintained regardless of the outdoor temperature. MIN = Lowest set-point value on the supply line regardless of the outdoor temperature (on the condition that heat stop does not apply). MAX = Highest set-point value on the supply line regardless of the outdoor temperature. CURVE5,0,-5 = The supply temperature can be adjusted up or down 5°C at these outdoor temperatures. HEAT STOP = Stops all production of heat when the outdoor temperature is the same as or greater than the set value. To exit heat stop the outdoor temperature must drop to 3°C below the set value.
2. Incorrectly positioned/installed sensors.	Check that outdoor sensors and any room sensors are installed according to the instructions and that they are calibrated.	• Check that the room sensor is positioned in a suitable place that is representative of the building and calibrate it if necessary. Avoid placing near external doors, windows and heat sources. • Install the outdoor sensor according to the instructions and calibrate it, if necessary.

10.4.6 Other

Table 33. Problem – The heat pump runs and runs but never stops

Cause	Troubleshooting	Remedy
1. Air in the heating system.	Listen for air in the heat pump and heating system.	Bleed the heating system according to the installation instructions.
2. Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant. If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.
3. Changed conditions Have you increased your heating and/or hot water demand?	• If the heat pump has been dimensioned for a certain demand and this demand is increased, the heat pump might not be able to maintain the desired room temperature. • If hot water consumption increases, a larger proportion of time is used to produce hot water, which means less time for heat production.	If the heat pump cannot cope with the demand, replace it with one with a higher output or supplement it with a higher output auxiliary heater.

Table 34. Problem – Runs on electric heating element

Cause	Troubleshooting	Remedy
1. Operating mode AUX. HEATER is selected.	If this operating mode is selected, the auxiliary heater is used for heating and hot water production, not the compressor.	If AUX. HEATER mode is selected and you no longer want it, change to AUTO, the heat pump then controls both the compressor and auxiliary heater.
2. The compressor cannot run due to an alarm.	Check the alarm that is indicated in the display.	Rectify the problem and rest the alarm. See Operational problems.
3. The integral value has reached the start level for the auxiliary heater.	Check what the integral value is in the control system.	If the auxiliary heater is in operation because the integral value has counted down to the start value, the computer reacts as it should, see(missing heading target)for more information.
4. Peak heat operation (anti-legionella function) is running.	Check if the heat pump runs peak heat. See the instructions for the relevant model.	Peak heat operation occurs in connection with hot water production with the set interval. The compressor should then start to produce hot water and 2 minutes later the auxiliary heater starts. The compressor must then stop and the stop temperature be reached with only the auxiliary heater connected. Take no corrective action.
5. The heat pump has stopped on HIGH RETURN.	• Check what the MAX RETURN value is set at in the heat pump's control computer. It must be adjusted to the unit's maximum supply temperature and the system's delta temperature so that it does not cut at too high a return temperature when the highest supply temperature is transmitted. • Check what the return line sensor shows. Is it a plausible/actual value? If not, take a resistance reading from the sensors and check against the ohm table in Measurement points.	If the MAX RETURN value is not adjusted for the system according to the troubleshooting window, adjust it. If the sensor is defective, replace it.

Cause	Troubleshooting	Remedy
6. The compressor runs backwards. The incoming phases have the incorrect sequence (only applies to 3-phase heat pumps). If the compressor runs backwards, it will not cope with compressing the refrigerant and therefore does not produce the correct power, which leads to the control system requesting auxiliary heating.	• If the text ERR PHASE SEQ. appears in the display when the heat pump is powered, (only appears in the first 10 minutes) this means that the phases have the incorrect sequence. • When the compressor is running, check the pressure pipe temperature by feeling the pressure pipe. If the phases are correctly sequenced it should be hot (not just warm) even a distance from the compressor. • When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling) when the compressor runs backwards.	If the phases are in the incorrect order, switch two incoming phases at the main terminal block and recheck according to the troubleshooting window.
7. Changed conditions Have you increased your heating and/or hot water demand?	• If the heat pump has been dimensioned for a certain demand and this demand is increased, the heat pump might not be able to maintain the desired room temperature. • If hot water consumption increases, a larger proportion of time is used to produce hot water, which means less time for heat production (only applies to system solution 1).	If the heat pump cannot cope with the demand, replace it with one with a higher output or supplement it with a higher output auxiliary heater.

Table 35. Problem – The auxiliary heater is in operation but not the compressor

Cause	Troubleshooting	Remedy
1. Operating mode AUX. HEATER is selected.	If this operating mode is selected, the auxiliary heater is used for heating and hot water production, not the compressor.	If AUX. HEATER mode is selected and you no longer want it, change to AUTO, the heat pump then controls both the compressor and auxiliary heater.
2. Peak heat operation (anti-legionella function) is running.	Check if the heat pump runs peak heat. See the instructions for the relevant model.	Peak heat operation occurs in connection with hot water production with the set interval. The compressor should then start to produce hot water and 2 minutes later the auxiliary heater starts. The compressor must then stop and the stop temperature be reached with only the auxiliary heater connected. Take no corrective action, this is normal.
3. The compressor cannot run due to an alarm.	Check the alarm that is indicated in the display.	Rectify the problem and rest the alarm. See Alarm.
4. The heat pump has stopped on high return.	• Check what the MAX value is set at in the heat pump's control computer. It must be adjusted to the unit's maximum supply temperature and the system's delta temperature so that it does not cut at too high a return temperature when the highest supply temperature is transmitted. • Check what the return line sensor shows. Is it a plausible/actual value? If not, take a resistance reading from the sensors and check against the ohm table in Mätpunkter.	• If the MAX RETURN value is not adjusted for the system according to the troubleshooting window, adjust it. • If the sensor is defective, replace it.

Cause	Troubleshooting	Remedy
5. The compressor has been stopped by the operating pressure switch or delivery line sensor.	Check if a square appears in the display's lower left corner. If so, the operating pressure switch is open or the delivery pipe sensor triggers an alarm for too high temperature. • The operating pressure switch is most easily checked by using a buzzer to see if it is connected. • The pressure pipe sensor value is read off from the control system in the HEAT PUMP menu. Is it a plausible/actual value? If not, take a resistance reading from the sensor and check against the ohm table in Mätpunkter. • The compressor has been stopped by the delivery line sensor and you have established that it shows the correct temperature. This may have been caused by a leak in the refrigerant circuit.	If the operating pressure switch has stuck in the open position, try gently tapping on the pressure switch head. If this does not help, or it sticks in the open position repeatedly, replace the pressure switch. If the delivery line sensor is defective, replace it. If the delivery line temperature gets so hot that the compressor stops, start by leak-tracing the unit. Rectify the leak, if a leak is found. If no leak is found, try draining and refilling the unit and then restarting the heat pump and seeing what the delivery line temperature is. If the problem persists, replace the compressor.
6. The built-in overheating protection (bi-metal protection) in the compressor has tripped.	Check if the heat pump's control computer indicates that the compressor is in operation, and if there is voltage in the soft-starter control inputs. Then read off and check that there is voltage on the compressor's electrical connection(s).	If there is voltage on the compressor's electrical connection(s) and the overheating protection does not close when the compressor has not run and has cooled down for at least 1 hour, replace the compressor.
7. The compressor runs backwards. The incoming phases have the incorrect sequence (only applies to 3-phase heat pumps). If the compressor runs backwards, it will not cope with compressing the refrigerant and therefore does not produce the correct power, which leads to the control system requesting auxiliary heating.	• If the text ERR PHASE SEQ. appears in the display when the heat pump is powered, (only appears in the first 10 minutes) this means that the phases have the incorrect sequence. • When the compressor is running, check the pressure pipe temperature by feeling the pressure pipe. If the phases are correctly sequenced it should be hot (not just warm) even a distance from the compressor. • When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling) when the compressor runs backwards.	If the phases are in the incorrect order, switch two incoming phases at the main terminal block and recheck according to the troubleshooting window.

Table 36. Problem – The heat pump consumes too much energy

Cause	Troubleshooting	Remedy
1. Blocked strainer in the heating system.	Check that the strainer is not blocked.	Clean the strainer if necessary.
2. The compressor cannot run due to an alarm.	Check the alarm that is indicated in the display.	Rectify the problem and rest the alarm. See the Operational problem – Alarm.
3. Incorrect flow over hot side of the heat pump.	Measurement check what the difference between the supply and return line is using a thermometer (Δt). The difference should be about 7-10°C (can vary depending on refrigerant). A lower Δt results in reduced efficiency in the heat pump.	Adjust the system to obtain the correct Δt.
4. Incorrect flow in the brine circuit.	Measurement check what the difference between the supply and return line is using a thermometer (Δt). The difference should not be more than 4°C. A greater Δt results in reduced efficiency in the heat pump.	If the difference is greater than 4°C note what is causing it. E.G.: Dirt in the filter, system restrictions, system with high pressure drop.

Cause	Troubleshooting	Remedy
5. The heat pump's control computer is not set/adjusted to the customer's requirements/wishes.	Check the ROOM and CURVE and MIN settings.	Adjust incorrect values in the heat pump's control computer. ROOM = Desired indoor temperature CURVE = Should be set so that the desired indoor temperature (ROOM) is maintained regardless of the outdoor temperature. MIN = Lowest set-point value on the supply line regardless of the outdoor temperature.
6. The interval for peak heat operation has changed to a lower value than the factory set value. This results in the heat pump going into peak heat operation more often than calculated.	Check the specified interval for peak heat operation in the control computer, see instructions for relevant model.	If there is a shorter interval between the peak heat productions, this explains why the unit consumes more current than calculated, but this does not mean for sure that it should be increased, there might be a reason why the interval has been changed.
7. The heat pump has stopped on HIGH RETURN.	• Check what the MAX RETURN value is set at in the heat pump's control computer. It must be adjusted to the unit's maximum supply temperature and the system's delta temperature so that it does not cut at too high a return temperature when the highest supply temperature is transmitted. • Check what the return line sensor shows. Is it a plausible/actual value? If not, take a resistance reading from the sensors and check against the ohm table in Mätpunkter.	If the MAX RETURN value is not adjusted for the system according to the troubleshooting window, adjust it. If the sensor is defective, replace it.
8. The compressor runs backwards. The incoming phases have the incorrect sequence (only applies to 3-phase heat pumps). If the compressor runs backwards, it will not cope with compressing the refrigerant and therefore does not produce the correct power, which leads to the control computer requesting auxiliary heating.	• If the text ERR PHASE SEQ. appears in the display when the heat pump is powered, (only appears in the first 10 minutes) this means that the phases have the incorrect sequence. • When the compressor is running, check the pressure pipe temperature by feeling the pressure pipe. If the phases are correctly sequenced it should be hot (not just warm) even a distance from the compressor. • When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling) when the compressor runs backwards.	If the phases are in the incorrect order, switch two incoming phases at the main terminal block and recheck according to the troubleshooting window.

Cause	Troubleshooting	Remedy
9. The compressor has been stopped by the operating pressure switch or delivery line sensor.	Check if a square appears in the display's lower left corner. If so, the operating pressure switch is open or the delivery pipe sensor triggers an alarm for too high temperature. • The operating pressure switch is most easily checked by using a buzzer to see if it is connected. • The delivery line sensor value is read off from the control computer in the HEAT PUMP menu. Is it a plausible/ actual value? If not, take a resistance reading from the sensor and check against the ohm table in the installation instructions. • The compressor has been stopped by the delivery line sensor and you have established that it shows the correct temperature. This may have been caused by a leak in the refrigerant circuit.	If the operating pressure switch has stuck in the open position, try gently tapping on the pressure switch head. If this does not help, or it sticks in the open position repeatedly, replace the pressure switch. If the delivery line sensor is defective, replace it. If the delivery line temperature gets so hot that the compressor stops, start by leak-tracing the unit. Rectify the leak, if a leak is found. If no leak is found, try draining and refilling the unit and then restarting the heat pump and seeing what the delivery line temperature is. If the problem persists, replace the compressor.
10. Expansion valve defective or incorrectly set.	Using manometer apparatus and thermometer check what the overheating reading of the unit is. Also check that bulb and capillary tube are undamaged and that the bulb is correctly installed.	If the overheating reading does not correspond with the instructions for the specific refrigerant, adjust the expansion valve until the correct value is obtained. See separate instructions for cooling techniques. If overheating cannot be adjusted with the expansion valve or if the capillary tube/bulb is damaged, replace it.
11. Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.
12. Overfilled refrigerant circuit.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	Follow the correct procedure (depending on type of refrigerant) to add the correct amount of refrigerant.
13. Short active collector, e.g. short or dry bore hole, short surface soil collector.	• Check the length of the collector that is being used and compare with the collector length in the dimensioning documentation. • In addition, check that the collector is not suspended "in free air" if boreholes are used.	If the active collector is too short, the heat pump cannot receive enough energy from the heat source , which results in it requiring an addition to cover the energy requirement.
14. Changed conditions Have you increased your heating and/or hot water demand?	• If the heat pump has been dimensioned for a certain demand and this demand is increased, the heat pump might not be able to maintain the desired room temperature. • If hot water consumption increases, a larger proportion of time is used to produce hot water, which means less time for heat production.	If the heat pump cannot cope with the demand, replace it with one with a higher output or supplement it with a higher output auxiliary heater.

Table 37. Problem – Auxiliary heater cuts in too soon

Cause	Troubleshooting	Remedy
1. The heat pump's control computer is not set/adjusted to the customer's requirements/wishes.	Check the ROOM, CURVE, INTEGRAL A1 and INTEGRAL A2 settings	Adjust incorrect values in the heat pump's control computer. ROOM = Desired indoor temperature CURVE = Should be set so that the desired indoor temperature (ROOM) is maintained regardless of the outdoor temperature. INTEGRAL A1 = Start value for the compressor. INTEGRAL A2 = Start value (calculated from A1) for the auxiliary heater.
2. Lack of refrigerant, not enough refrigerant in the system.	Using manometer apparatus and thermometer, check that the unit's overheating is correct for the specific refrigerant.	If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.
3. Short active collector, e.g. short or dry bore hole, short surface soil collector.	• Check the length of the collector that is being used and compare with the collector length in the dimensioning documentation. • In addition, check that the collector is not suspended "in free air" if boreholes are used.	If the active collector is too short, the heat pump cannot receive enough energy from the heat source , which results in it requiring an addition to cover the energy requirement.
4. Collector too long, pressure drop too great.	Check the length of the collector that is being used and that it is connected in parallel (not connected in series) if more than 1 coil is being used.	If a longer collector is being used than recommended for the specific heat pump, it must be divided on several parallel connected coils.
5. Changed conditions Have you increased your heating and/or hot water demand?	• If the heat pump has been dimensioned for a certain demand and this demand is increased, the heat pump might not be able to maintain the desired room temperature. • If hot water consumption increases, a larger proportion of time is used to produce hot water, which means less time for heat production (only applies to system solution 1).	If the heat pump cannot cope with the demand, replace it with one with a higher output or supplement it with a higher output auxiliary heater.

Table 38. Problem – Short operating times despite heating demand

Cause	Troubleshooting	Remedy
ROOM and/or CURVE set too high in combination with a heating system with poor circulation due to closed radiator valves, too small elements or insufficient water volume. A tight fitting system with poor pipe dimensions may produce the same phenomena.	Check if the heat pumps starts, if the supply temperature rises quickly whilst nothing happens to the return temperature. If this happens and the heat pump is stopped by the hysteresis function to later quickly drop in temperature (supply) in order to start again, but cannot due to time conditions in regulation, this means that the heat pump cannot transport the heat away from the condenser as it should. In such a case, hysteresis starts and stops the heat pump often.	Adjust ROOM and CURVE if necessary. Ensure that there is sufficient flow over the condenser and the heating circuit.

Table 39. Problem – Connection of external AH

Cause	Troubleshooting	Remedy
Incorrectly connected auxiliary heater. Does not start when the control computer gives the signal.	Check the connection against the instructions/wiring diagram. Test the function in manual mode.	If the auxiliary heater is incorrectly connected, reconnect according to the instructions.

10.4.7 Outdoor section (Applies to DHP-A)

Table 40. Problem – Noise/loud noise

Cause	Troubleshooting	Remedy
1. Positioning the outdoor unit.	Determine whether the outdoor unit can be moved to a more suitable location.	When positioning the outdoor unit, its direction does not affect its performance. The outdoor unit does not need to be positioned as close to the heat pump as necessary, it can be positioned as far as 30 ”pipe metres” away.
2. Connection/wall lead-ins.	Check that the unit is installed according to the instructions. Is the outdoor unit secured to the wall?	Rigid mountings can generate noise from the outdoor section via walls in the house.

Table 41. Problem – Defrosting problems

Cause	Troubleshooting	Remedy
1. Location/calibration of the outdoor sensor.	Check that the outdoor sensor is installed according to the installation instructions and that it is correctly calibrated.	Install according to the instructions and calibrate, if necessary. Alternatively, the outdoor sensor can be located behind the outdoor unit 20 cm out from the rear side of the outdoor unit.
2. Brine temperature in/out.	Measurement check the temperatures with a thermometer.	If necessary, calibrate BRINE IN and BRINE OUT in the heat pump’s control computer.
3. The defroster shunt does not regulate as it should.	Manually test to check if the defroster shunt opens and closes the flow over the defroster tank. If the motor switches position when testing, but defrosting still does not function, remove the motor and try closing and opening the valve by hand by pressing in the control arm.	If the motor is defective, replace it. If the insert jams, remove and clean/lubricate it, or replace it.

Table 42. Problem – Build-up of ice under and around the outdoor unit

Cause	Troubleshooting	Remedy
Insufficient drainage.	Does a lot of ice accumulate under and around the outdoor unit because the melted water has nowhere to run?	Drain the ground under and around the outdoor section or install a drip tray with a drainpipe routed to an indoor drain or gully. NOTE! A heating cable may have to be installed in the drainpipe.

Table 43. Problem – Water run-off by the outdoor unit, risk of moisture problems in house foundations

Cause	Troubleshooting	Remedy
Insufficient drainage.	During some periods when the outdoor unit is being defrosted, large amounts (20-40 L/day) of water can run off.	Drain the ground under and around the outdoor unit so that it can cope with the extra amount of water produced because of defrosting or install a drip tray with a drainpipe routed to an indoor drain or gully. NOTE! A heating cable may have to be installed in the drainpipe.

11 Technical data, DHP-H

Table 44. Technical data

DHP-H			4	6	8	10	12	16
Type			Brine/water					
Refrigerant	Type		R407C					
	Amount	kg	0,75	1,20	1,30	1,45	1,55	2,00
	Test pressurisation	MPa	3,4					
	Design pressure	MPa	3,1					
Compressor	Type		Scroll					
	Oil		POE					
Electrical data 3-N, ~50 Hz	Mains power supply	V	400					
	Rated output, compressor	kW	2,7	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,2	0,2	0,2	0,5	0,5	0,6
	Auxiliary heater, 3 step	kW	3/6/9					
	Start current[3]	A	17	12	10	18	17	18
	Fuse	A	16[9]/10[4]/10[5]/16[6]	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	230	*
	Rated output, compressor	kW	2,7	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,2	0,2	0,2	0,5	0,5	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	17	11	21	26	28	*
	Fuse	A	20[4]/25[5]/32[6]	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	3,52	5,33	7,51	9,40	11,0	16,4
	COP[1]		3,90	4.04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	3,42	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,05	3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	0,9	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,20	0,36	0,49	0,62	0,71	1,02
	Heating circuit	l/s	0,09	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	38	35	32	76	69	37
	Heating circuit	kPa	51	48	44	39	58	54
Max/Min temperature	Cooling circuit	°C	20/-10					
	Heating circuit	°C	55/20					
Pressure switches	Low pressure	MPa	0,08					
	Operation	MPa	2,85					
	High pressure	MPa	3,10					
Water volume	Water heater	l	180					
	Condenser	l	0,8	1,6	1,9	2,1	2,1	2,9

DHP-H			4	6	8	10	12	16
	Evaporator	l	0,7	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	*	*	*	*	*	*
Antifreeze			Ethylene glycol/ Ethanol					
Number of units			1					
Dimensions L x W x H		mm	690x596x1845					
Weight empty		kg	225	229	229	229	238	242
Weight filled		kg	405	409	409	409	418	422
Sound power level[11]		dB(A)	46	47	44	46	48	57

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

12 Technical data; DHP-H Opti

Table 45. Technical data

DHP-H Opti			6	8	10	12	16
Type			Brine/water				
Refrigerant	Type		R407C				
	Amount	kg	1,2	1,35	1,45	1,55	2,00
	Test pressurisation	MPa	3,4				
	Design pressure	MPa	3,1				
Compressor	Type		Scroll				
	Oil		POE				
Electrical data 3-N, ~50 Hz	Mains power supply	V	400				
	Rated output, compressor	kW	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	0,5
	Auxiliary heater, 3 step	kW	3/6/9				
	Start current[3]	A	12	10	18	17	18
	Fuse	A	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	*
	Rated output, compressor	kW	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	11	21	26	28	*
	Fuse	A	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	5,33	7,51	9,40	11,0	16,4
	COP[1]		4.04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,36	0,48	0,62	0,71	1,02
	Heating circuit	l/s	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	37	42	63	45	52
	Heating circuit	kPa	63	60	56	58	96
Max/Min temperature	Cooling circuit	°C	20/-10				
	Heating circuit	°C	55/20				
Pressure switches	Low pressure	MPa	0,08				
	Operation	MPa	2,85				
	High pressure	MPa	3,10				
Water volume	Water heater	l	180				
	Condenser	l	1,6	1,9	2,1	2,1	2,9
	Evaporator	l	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	*	*	*	*	*
Antifreeze			Ethylene glycol/ Ethanol				

DHP-H Opti			6	8	10	12	16
Number of units			1				
Dimensions L x W x H		mm	690x596x1845				
Weight empty		kg	229	229	229	238	242
Weight filled		kg	409	409	409	418	422
Sound power level[11]		dB(A)	47	44	46	48	57

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

13 Technical data; DHP-H Opti Pro

Table 46. Technical data

DHP-H Opti Pro			6	8	10	12	16
Type			Brine/water				
Refrigerant	Type		R407C				
	Amount	kg	1,15	1,35	1,40	1,55	1,70
	Test pressurisation	MPa	3,4				
	Design pressure	MPa	3,1				
Compressor	Type		Scroll				
	Oil		POE				
Electrical data 3-N, ~50 Hz	Mains power supply	V	400				
	Rated output, compressor	kW	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	0,5
	Auxiliary heater, 3 step	kW	3/6/9				
	Start current[3]	A	12	10	18	17	18
	Fuse	A	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	*
	Rated output, compressor	kW	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	11	21	26	28	*
	Fuse	A	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	5,33	7,51	9,40	11,0	16,4
	COP[1]		4.04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,36	0,48	0,62	0,71	1,02
	Heating circuit	l/s	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	37	42	63	45	52
	Heating circuit	kPa	63	60	56	58	96
Max/Min temperature	Cooling circuit	°C	20/-10				
	Heating circuit	°C	55/20				
Pressure switches	Low pressure	MPa	0,08				
	Operation	MPa	2,85				
	High pressure	MPa	3,10				
Water volume	Water heater	l	180				
	Condenser	l	1,6	1,9	2,1	2,1	2,9
	Evaporator	l	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	0,2				
Antifreeze			Ethylene glycol/ Ethanol				

DHP-H Opti Pro			6	8	10	12	16
Number of units			1				
Dimensions L x W x H		mm	690x596x1845				
Weight empty		kg	231	231	231	240	244
Weight filled		kg	411	411	411	420	424
Sound power level[11]		dB(A)	45	42	45	49	50

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

14 Technical data, DHP-L

Table 47. Technical data

DHP-L			4	6	8	10	12	16
Type			Brine/water					
Refrigerant	Type		R407C					
	Amount	kg	0,75	1,20	1,30	1,45	1,55	2,00
	Test pressurisation	MPa	3,4					
	Design pressure	MPa	3,1					
Compressor	Type		Scroll					
	Oil		POE					
Electrical data 3-N, ~50 Hz	Mains power supply	V	400					
	Rated output, compressor	kW	2,7	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,2	0,2	0,2	0,5	0,5	0,6
	Auxiliary heater, 3 step	kW	3/6/9					
	Start current[3]	A	17	12	10	18	17	18
	Fuse	A	16[9]/10[4]/10[5]/16[6]	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	230	*
	Rated output, compressor	kW	2,7	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,2	0,2	0,2	0,5	0,5	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	17	11	21	26	28	*
	Fuse	A	20[4]/25[5]/32[6]	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	3,52	5,33	7,51	9,40	11,0	16,4
	COP[1]		3,90	4,04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	3,42	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,05	3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	0,9	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,20	0,36	0,49	0,62	0,71	1,02
	Heating circuit	l/s	0,09	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	38	35	32	76	69	37
	Heating circuit	kPa	51	48	44	39	58	54
Max/Min temperature	Cooling circuit	°C	20/-10					
	Heating circuit	°C	55/20					
Pressure switches	Low pressure	MPa	0,08					
	Operation	MPa	2,85					
	High pressure	MPa	3,10					
Water volume	Water heater	l	*	*	*	*	*	*
	Condenser	l	0,8	1,6	1,9	2,1	2,1	2,9

DHP-L			4	6	8	10	12	16
	Evaporator	l	0,7	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	*	*	*	*	*	*
Antifreeze			Ethylene glycol/ Ethanol					
Number of units			1					
Dimensions L x W x H		mm	690x596x1538					
Weight empty		kg	140	145	150	155	165	175
Weight filled		kg	145	151	157	162	172	184
Sound power level[11]		dB(A)	46	44	44	47	48	50

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

15 Technical data, DHP-L Opti

Table 48. Technical data

DHP-L Opti			6	8	10	12	16
Type			Brine/water				
Refrigerant	Type		R407C				
	Amount	kg	1,20	1,35	1,45	1,55	2,00
	Test pressurisation	MPa	3,4				
	Design pressure	MPa	3,1				
Compressor	Type		Scroll				
	Oil		POE				
Electrical data 3-N, ~50 Hz	Mains power supply	V	400				
	Rated output, compressor	kW	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	0,5
	Auxiliary heater, 3 step	kW	3/6/9				
	Start current[3]	A	12	10	18	17	18
	Fuse	A	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	*
	Rated output, compressor	kW	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	11	21	26	28	*
	Fuse	A	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	5,33	7,51	9,40	11,0	16,4
	COP[1]		4.04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,36	0,48	0,62	0,71	1,02
	Heating circuit	l/s	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	37	42	63	45	52
	Heating circuit	kPa	63	60	56	58	96
Max/Min temperature	Cooling circuit	°C	20/-10				
	Heating circuit	°C	55/20				
Pressure switches	Low pressure	MPa	0,08				
	Operation	MPa	2,85				
	High pressure	MPa	3,10				
Water volume	Water heater	l	*	*	*	*	*
	Condenser	l	1,6	1,9	2,1	2,1	2,9
	Evaporator	l	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	*	*	*	*	*

DHP-L Opti			6	8	10	12	16
Antifreeze			Ethylene glycol/ Ethanol				
Number of units			1				
Dimensions L x W x H		mm	690x596x1538				
Weight empty		kg	145	150	155	165	175
Weight filled		kg	151	157	162	172	184
Sound power level[11]		dB(A)	44	44	47	48	50

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

16 Technical data; DHP-L Opti Pro

Table 49. Technical data

DHP-L Opti Pro			6	8	10	12	16
Type			Brine/water				
Refrigerant	Type		R407C				
	Amount	kg	1,15	1,35	1,40	1,55	1,70
	Test pressurisation	MPa	3,4				
	Design pressure	MPa	3,1				
Compressor	Type		Scroll				
	Oil		POE				
Electrical data 3-N, ~50 Hz	Mains power supply	V	400				
	Rated output, compressor	kW	3,0	3,2	4,2	5,0	7,2
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	0,5
	Auxiliary heater, 3 step	kW	3/6/9				
	Start current[3]	A	12	10	18	17	18
	Fuse	A	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/20[5]/25[6]	20[4]/20[5]/25[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	230	230	230	230	*
	Rated output, compressor	kW	3,2	3,6	4,5	5,5	*
	Rated output, circulation pumps	kW	0,1	0,1	0,2	0,2	*
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	1,5/3,0/4,5	*
	Start current[3]	A	11	21	26	28	*
	Fuse	A	25[4]/32[5]/40[6]	25[4]/32[5]/40[6]	32[4]/40[5]/50[6]	32[4]/40[5]/50[6]	*
Performance[10]	Heat factor[1]	kW	5,33	7,51	9,40	11,0	16,4
	COP[1]		4,04	4,34	4,24	4,20	3,99
	Heat factor[2]	kW	5,38	7,40	9,24	10,6	15,6
	COP[2]		3,41	3,57	3,51	3,39	3,19
	Incoming power[1]	kW	1,3	1,7	2,2	2,6	4,1
Nominal flow[8]	Cooling circuit	l/s	0,36	0,48	0,62	0,71	1,02
	Heating circuit	l/s	0,14	0,19	0,24	0,28	0,39
External available pressure [7]	Cooling circuit	kPa	37	42	63	45	52
	Heating circuit	kPa	63	60	56	58	96
Max/Min temperature	Cooling circuit	°C	20/-10				
	Heating circuit	°C	55/20				
Pressure switches	Low pressure	MPa	0,08				
	Operation	MPa	2,85				
	High pressure	MPa	3,10				
Water volume	Water heater	l	*				
	Condenser	l	1,6	1,9	2,1	2,1	2,9
	Evaporator	l	0,7	1,2	1,6	1,6	2,2
	De-superheater	l	0,2				
Antifreeze			Ethylene glycol/ Ethanol				
Number of units			1				

DHP-L Opti Pro			6	8	10	12	16
Dimensions L x W x H		mm	690x596x1538				
Weight empty		kg	150	155	160	170	180
Weight filled		kg	156	162	167	177	189
Sound power level[11]		dB(A)	45	42	45	49	50

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ 3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

17 Technical data, DHP-C

Table 50. Technical data

DHP-C			6	8	10	4H	5H	7H
Type			Brine/water					
Refrigerant	Type		R407C	R407C	R407C	R134a	R134a	R134a
	Amount	kg	1,20	1,30	1,45	0,90	1,00	1,10
	Test pressurisation	MPa	3,4	3,4	3,4	3,2	3,2	3,2
	Design pressure	MPa	3,1	3,1	3,1	2,45	2,45	2,45
Compressor	Type		Scroll					
	Oil		POE					
Electrical data 3-N, ~50 Hz	Mains power supply	V	400					
	Rated output, compressor	kW	3,0	3,2	4,2	3,0	3,2	4,2
	Rated output, circulation pumps	kW	0,2	0,2	0,5	0,2	0,2	0,3
	Auxiliary heater, 3 step	kW	3/6/9					
	Start current[3]	A	12	10	18	12	10	18
	Fuse	A	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]	10[4]/16[5]/20[6]	16[4]/16[5]/20[6]	16[4]/16[5]/20[6]
Electrical data 1-N, ~50 Hz	Mains power supply	V	*	*	*	*	*	*
	Rated output, compressor	kW	*	*	*	*	*	*
	Rated output, circulation pumps	kW	*	*	*	*	*	*
	Auxiliary heater, 3 step	kW	*	*	*	*	*	*
	Start current[3]	A	*	*	*	*	*	*
	Fuse	A	*	*	*	*	*	*
Performance[10]	Heat factor[1]	kW	5,33	7,51	9,40	-	-	-
	COP[1]		4,04	4,34	4,24	-	-	-
	Heat factor[2]	kW	5,38	7,40	9,24	3,20	4,50	5,50
	COP[2]		3,41	3,57	3,51	2,70	2,90	2,90
	Incoming power[1]	kW	1,3	1,7	2,2	-	-	-
Nominal flow[8]	Cooling circuit	l/s	0,36	0,49	0,62	0,20	0,28	0,37
	Heating circuit	l/s	0,14	0,19	0,24	0,08	0,12	0,14
External available pressure [7]	Cooling circuit	kPa	35	32	76	37	54	60
	Heating circuit	kPa	48	44	39	48	50	43
Max/Min temperature	Cooling circuit	°C	20/-10					
	Heating circuit	°C	55/20					
Pressure switches	Low pressure	MPa	0,08	0,08	0,08	0,03	0,03	0,03
	Operation	MPa	2,85	2,85	2,85	1,80	1,80	1,80
	High pressure	MPa	3,10	3,10	3,10	2,45	2,45	2,45
Water volume	Water heater	l	180					
	Condenser	l	1,6	1,9	2,1	1,6	1,9	2,1
	Evaporator	l	0,7	1,2	1,6	0,7	1,2	1,6

DHP-C			6	8	10	4H	5H	7H
	De-superheater	l	*	*	*	*	*	*
Antifreeze			Ethylene glycol/ Ethanol					
Number of units			1					
Dimensions L x W x H		mm	690x596x1845					
Weight empty		kg	210	215	225	210	215	225
Weight filled		kg	390	395	405	390	395	405
Sound power level[11]		dB(A)	47	44	46	47	44	46

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) At B0W35 according to EN14511 (including circulation pumps).

2) At B0W45 according to EN14511 (including circulation pumps).

3) According to IEC61000.

4) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

5) Heat pump with 6 kW auxiliary heater (1-N 3 kW).

6) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

7) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow. For the cooling circuit, these valves require pipe dimension Ø 40 x 2.4.

8) Nominal flow: Heat circuit Δ10 K, cooling circuit Δ 3 K.

9) Fuse phase L1 (size 4 has 1-phase compressor).

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at BOW45 (EN 12102).

*) Not available for this version

18 Technical data, DHP-A

Table 51. Technical data

DHP-A			6	8	10	12
Type			Air/water			
Refrigerant	Type		R404A			
	Amount	kg	0,95	1,45	1,50	1,60
	Test pressurisation	MPa	3,4			
	Design pressure	MPa	3,1			
Compressor	Type		Scroll			
	Oil		POE			
Electrical data 3-N ~50Hz	Mains power supply	V	400			
	Rated output, compressor	kW	3,0	3,2	4,2	5,0
	Rated output, circ.pumps/fan	kW	0,4	0,6	0,6	0,7
	Auxiliary heater, 5 step	kW	3/6/9/12/15			
	Start current[16]	A	12	10	18	17
	Fuse	A	10[3]/16[4]/20[5]/20[6]/25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/25[7]/30[14]/35[15]	16[3]/20[4]/25[5]/25[6]/25[7]/30[14]/35[15]
Electrical data 1-N ~50Hz	Mains power supply	V	230			
	Rated output, compressor	kW	3,2	3,6	4,5	5,5
	Rated output, circ.pumps/fan	kW	0,4	0,6	0,6	0,7
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5			
	Start current[16]	A	11	21	26	28
	Fuse	A	25[3]/32[4]/40[5]	25[3]/32[4]/40[5]	32[3]/40[4]/50[5]	32[3]/40[4]/50[5]
Performance[10]	Heat factor[1]	kW	5,00	7,02	8,20	9,84
	COP[1]		2,85	3,10	2,85	3,00
	Heat factor[2]	kW	5,90	7,96	9,85	11,3
	COP[2]		3,26	3,45	3,29	3,35
	Incoming power[2]	kW	1,8	2,3	3,0	3,4
Nominal flow[8]	Cooling circuit	l/s	0,32	0,49	0,58	0,64
	Heating circuit	l/s	0,14	0,20	0,24	0,28
External available pressure [9]	Cooling circuit	kPa	46	83	69	95
	Heating circuit	kPa	45	43	40	51
Lowest outdoor temperature for compressor start		°C	-20			
Max/Min temperature	Cooling circuit	°C	20/-25			
	Heating circuit	°C	55/20			
Pressure switches	Low pressure	MPa	0,08			
	Operation	MPa	2,65/2,85			

DHP-A			6	8	10	12
	High pressure	MPa	3,10			
Water volume	Water heater	l	180			
	Condenser	l	1,3	2,2	2,7	2,7
	Evaporator	l	1,0	1,3	1,3	1,6
Antifreeze [13]			Ethylene glycol + water solution with freezing point -32±1°C			
Number of units			2			
Indoor unit	Dimensions L x W x H	mm	690x596x1845			
	Weight empty	kg	260	260	260	268
	Weight filled	kg	440	440	440	448
	Sound power level[11]	dB(A)	42	48	46	48
Outdoor unit	Dimensions L x W x H	mm	630x1175x1245			
	Weight empty	kg	94			
	Weight filled	kg	99			
	Sound power level. Low/high [12]	dB(A)	53/63	53/63	54/67	54/67
	Fan speed, low/ high	rpm	450/600	450/600	500/800	500/800
	Air flow, low/high	m^3/h	2500/3200	2500/3200	2500/3900	2500/3900
Max pipe length (copper pipe Ø 28 mm between heat pump and out- door unit)		m	60 (30+30)			

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) For A2W35 according to EN14511 (including circulation pumps and outdoor units).

2) For A7W35 according to EN14511 (including circulation pumps and outdoor units).

3) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

4) Heat pump with 6 kW auxiliary heater (1-N 3.0 kW).

5) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

6) 12 kW aux. heater (compressor off).

7) 15 kW aux. heater (compressor off).

8) Nominal flow: Heat transfer fluid Δ10K, cooling circuit Δ3K.

9) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow.

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at A7W45 (EN 12102).

12) Sound power level measured according to EN ISO 3471.

13) Do not use propylene glycol or ethanol.

14) Heat pump with 12 kW additional heater.

15) Heat pump with 15 kW additional heater.

16) According to IEC61000.

19 Technical data, DHP-A Opti

Table 52. Technical data

DHP-A Opti			6	8	10	12
Type			Air/water			
Refrigerant	Type		R404A			
	Amount	kg	0,95	1,45	1,50	1,60
	Test pressurisation	MPa	3,4			
	Design pressure	MPa	3,1			
Compressor	Type		Scroll			
	Oil		POE			
Electrical data 3-N ~50Hz	Mains power supply	V	400			
	Rated output, compressor	kW	3,0	3,2	4,2	5,0
	Rated output, circ.pumps/fan	kW	0,3	0,3	0,4	0,6
	Auxiliary heater, 5 step	kW	3/6/9/12/15			
	Start current[16]	A	12	10	18	17
	Fuse	A	10[3]/16[4]/20[5]/20[6]/ 25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/ 25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/ 25[7]/30[14]/35[15]	16[3]/20[4]/25[5]/25[6]/ 25[7]/30[14]/35[15]
Electrical data 1-N ~50Hz	Mains power supply	V	230			
	Rated output, compressor	kW	3,2	3,6	4,5	5,5
	Rated output, circ.pumps/fan	kW	0,3	0,3	0,4	0,6
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5			
	Start current[16]	A	11	21	26	28
	Fuse	A	25[3]/32[4]/40[5]	25[3]/32[4]/40[5]	32[3]/40[4]/50[5]	32[3]/40[4]/50[5]
Performance[10]	Heat factor[1]	kW	5,00	7,02	8,20	9,84
	COP[1]		2,85	3,10	2,85	3,00
	Heat output[2]	kW	5,90	7,96	9,85	11,3
	COP[2]		3,26	3,45	3,29	3,35
	Incoming power[2]	kW	1,8	2,3	3,0	3,4
Nominal flow[8]	Cooling circuit	l/s	0,32	0,49	0,58	0,64
	Heating circuit	l/s	0,14	0,20	0,24	0,28
External available pressure [9]	Cooling circuit	kPa	88	74	56	98
	Heating circuit	kPa	61	59	57	51
Lowest outdoor temperature for compressor start		°C	-20			
Max/Min temperature	Cooling circuit	°C	20/-25			
	Heating circuit	°C	55/20			
Pressure switches	Low pressure	MPa	0,08			
	Operation	MPa	2,65/2,85			
	High pressure	MPa	3,10			

DHP-A Opti			6	8	10	12
Water volume	Water heater	l	180			
	Condenser	l	1,3	2,2	2,7	2,7
	Evaporator	l	1,0	1,3	1,3	1,6
Antifreeze [13]			Ethylene glycol + water solution with freezing point -32±1°C			
Number of units			2			
Indoor unit	Dimensions L x W x H	mm	690x596x1845			
	Weight empty	kg	260	260	260	268
	Weight filled	kg	440	440	440	448
	Sound power level[11]	dB(A)	42	48	46	48
Outdoor unit	Dimensions L x W x H	mm	630x1175x1245			
	Weight empty	kg	94			
	Weight filled	kg	99			
	Sound power level, low/high [12]	dB(A)	53/63	53/63	54/67	54/67
	Fan speed, low/high	rpm	450/600	450/600	500/800	500/800
	Air flow, low/high	m^3/h	2500/3200	2500/3200	2500/3900	2500/3900
Max pipe length (copper pipe Ø28mm between heat pump and outdoor unit)		m	60 (30+30)			

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) For A2W35 according to EN14511 (including circulation pumps and outdoor units).

2) For A7W35 according to EN14511 (including circulation pumps and outdoor units).

3) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

4) Heat pump with 6 kW auxiliary heater (1-N 3.0 kW).

5) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

6) 12 kW aux. heater (compressor off).

7) 15 kW aux. heater (compressor off).

8) Nominal flow: Heat transfer fluid Δ10K, cooling circuit Δ3K.

9) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow.

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at A7W45 (EN 12102).

12) Sound power level measured according to EN ISO 3741.

13) Do not use propylene glycol or ethanol.

14) Heat pump with 12 kW additional heater.

15) Heat pump with 15 kW additional heater.

16) According to IEC61000.

20 Technical data, DHP-AL

Table 53. Technical data

DHP-AL			6	8	10	12
Type			Air/water			
Refrigerant	Type		R404A			
	Amount	kg	0,95	1,45	1,50	1,60
	Test pressurisation	MPa	3,4			
	Design pressure	MPa	3,1			
Compressor	Type		Scroll			
	Oil		POE			
Electrical data 3-N ~50Hz	Mains power supply	V	400			
	Rated output, compressor	kW	3,0	3,2	4,2	5,0
	Rated output, circ.pumps/fan	kW	0,4	0,6	0,6	0,7
	Auxiliary heater, 5 step	kW	3/6/9/12/15			
	Start current[16]	A	12	10	18	17
	Fuse	A	10[3]/16[4]/20[5]/20[6]/ 25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/ 25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/ 25[7]/30[14]/35[15]	16[3]/20[4]/25[5]/25[6]/ 25[7]/30[14]/35[15]
Electrical data 1-N ~50Hz	Mains power supply	V	230			
	Rated output, compressor	kW	3,2	3,6	4,5	5,5
	Rated output, circ.pumps/fan	kW	0,4	0,6	0,6	0,7
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5			
	Start current[16]	A	11	21	26	28
	Fuse	A	25[3]/32[4]/40[5]	25[3]/32[4]/40[5]	32[3]/40[4]/50[5]	32[3]/40[4]/50[5]
Performance[10]	Heat factor[1]	kW	5,00	7,02	8,20	9,84
	COP[1]		2,85	3,10	2,85	3,00
	Heat factor[2]	kW	5,90	7,96	9,85	11,3
	COP[2]		3,26	3,45	3,29	3,35
	Incoming power[2]	kW	1,8	2,3	3,0	3,4
Nominal flow[8]	Cooling circuit	l/s	0,32	0,49	0,58	0,64
	Heating circuit	l/s	0,14	0,20	0,24	0,28
External available pressure [9]	Cooling circuit	kPa	46	83	69	95
	Heating circuit	kPa	45	43	40	51
Lowest outdoor temperature for compressor start		°C	-20			
Max/Min temperature	Cooling circuit	°C	20/-25			
	Heating circuit	°C	55/20			
Pressure switches	Low pressure	MPa	0,08			
	Operation	MPa	2,65/2,85			
	High pressure	Mpa	3,10			

DHP-AL			6	8	10	12
Water volume	Water heater	l	180			
	Condenser	l	1,3	2,2	2,7	2,7
	Evaporator	l	1,0	1,3	1,3	1,6
Antifreeze [13]			Ethylene glycol + water solution with freezing point -32±1°C			
Number of units			3			
Indoor unit	Dimensions L x W x H	mm	690x596x1538			
	Weight empty	kg	154	154	154	162
	Weight filled	kg	158	159	160	168
	Sound power level[11]	dB(A)	42	48	46	48
Water heater	Dimensions L x W x H	mm	690x596x1538			
	Weight empty	kg	172			
	Weight filled	kg	352			
Outdoor unit	Dimensions L x W x H	mm	630x1175x1245			
	Weight empty	kg	94			
	Weight filled	kg	99			
	Sound power level, low/high [12]	dB(A)	53/63	53/63	54/67	54/67
	Fan speed, high/low	rpm	450/600	450/600	500/800	500/800
	Air flow, low/high	m^3/h	2500/3200	2500/3200	2500/3900	2500/3900
Max pipe length (copper pipe Ø28mm between heat pump and out-door unit)		m	60 (30+30)			

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) For A2W35 according to EN14511 (including circulation pumps and outdoor units).

2) For A7W35 according to EN14511 (including circulation pumps and outdoor units).

3) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

4) Heat pump with 6 kW auxiliary heater (1-N 3.0 kW).

5) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

6) 12 kW aux. heater (compressor off).

7) 15 kW aux. heater (compressor off).

8) Nominal flow: Heat transfer fluid Δ10K, cooling circuit Δ3K.

9) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow.

10) The values apply to new heat pumps with clean heat exchangers

11) Sound power level measured according to EN ISO 3741 at A7W45 (EN 12102).

12) Sound power level measured according to EN ISO 3741.

13) Do not use propylene glycol or ethanol.

14) Heat pump with 12 kW additional heater.

15) Heat pump with 15 kW additional heater.

16) According to IEC6100

21 Technical data, DHP-AL Opti

Table 54. Technical data

DHP-AL Opti			6	8	10	12
Type			Air/water			
Refrigerant	Type		R404A			
	Amount	kg	0,95	1,45	1,50	1,60
	Test pressurisation	MPa	3,4			
	Design pressure	MPa	3,1			
Compressor	Type		Scroll			
	Oil		POE			
Electrical data 3-N ~50Hz	Mains power supply	V	400			
	Rated output, compressor	kW	3,0	3,2	4,2	5,0
	Rated output, circ.pumps/fan	kW	0,3	0,3	0,4	0,6
	Auxiliary heater, 5 step	kW	3/6/9/12/15			
	Start current[16]	A	12	10	18	17
	Fuse	A	10[3]/16[4]/20[5]/20[6]/25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/25[7]/25[14]/30[15]	16[3]/16[4]/20[5]/20[6]/25[7]/30[14]/35[15]	16[3]/20[4]/25[5]/25[6]/25[7]/30[14]/35[15]
Electrical data 1-N ~50Hz	Mains power supply	V	230			
	Rated output, compressor	kW	3,2	3,6	4,5	5,5
	Rated output, circ.pumps/fan	kW	0,3	0,3	0,4	0,6
	Auxiliary heater, 3 step	kW	1,5/3,0/4,5			
	Start current[16]	A	11	21	26	28
	Fuse	A	25[3]/32[4]/40[5]	25[3]/32[4]/40[5]	32[3]/40[4]/50[5]	32[3]/40[4]/50[5]
Performance[10]	Heat output[1]	kW	5,00	7,02	8,20	9,84
	COP[1]		2,85	3,10	2,85	3,00
	Heat output[2]	kW	5,90	7,96	9,85	11,3
	COP[2]		3,26	3,45	3,29	3,35
	Incoming power[2]	kW	1,8	2,3	3,0	3,4
Nominal flow[8]	Cooling circuit	l/s	0,32	0,49	0,58	0,64
	Heating circuit	l/s	0,14	0,20	0,24	0,28
External available pressure [9]	Cooling circuit	kPa	88	74	56	98
	Heating circuit	kPa	61	59	57	51
Lowest outdoor temperature for compressor start		°C	-20			
Max/Min temperature	Cooling circuit	°C	20/-25			
	Heating circuit	°C	55/20			
Pressure switches	Low pressure	MPa	0,08			
	Operation	MPa	2,65/2,85			
	High pressure	MPa	3,10			
Water volume	Water heater	l	180			

DHP-AL Opti			6	8	10	12
	Condenser	l	1,3	2,2	2,7	2,7
	Evaporator	l	1,0	1,3	1,3	1,6
Antifreeze [13]			Ethylene glycol + water solution with freezing point below -32±1°C			
Number of units			3			
Indoor unit	Dimensions L x W x H	mm	690x596x1538			
	Weight empty	kg	154	154	154	162
	Weight filled	kg	158	159	160	168
	Sound power level[11]	dB(A)	42,5	47,7	45,5	48,1
Water heater	Dimensions L x W x H	mm	690x596x1538			
	Weight empty	kg	172			
	Weight filled	kg	352			
Outdoor unit	Dimensions L x W x H	mm	630x1175x1245			
	Weight empty	kg	94			
	Weight filled	kg	99			
	Sound power level, high/low[12]	dB(A)	53/63	53/63	54/67	54/67
	Fan speed, high/low	rpm	450/600	450/600	500/800	500/800
	Air flow, low/high	m^3/h	2500/3200	2500/3200	2500/3900	2500/3900
Max pipe length (copper pipe Ø28mm between heat pump and out-door unit)		m	60 (30+30)			

Measurements have been carried out on a limited number of circulation pumps, which can give variations in results. Tolerances in the measurement methods can also give variations.

1) For A2W35 according to EN14511 (including circulation pumps and outdoor units).

2) For A7W35 according to EN14511 (including circulation pumps and outdoor units).

3) Heat pump with 3 kW auxiliary heater (1-N 1.5 kW).

4) Heat pump with 6 kW auxiliary heater (1-N 3.0 kW).

5) Heat pump with 9 kW auxiliary heater (1-N 4.5 kW).

6) 12 kW aux. heater (compressor off).

7) 15 kW aux. heater (compressor off).

8) Nominal flow: Heat circuit Δ10K, cooling circuit Δ3K.

9) The pressure that must not be exceeded outside the heat pump without falling below the nominal flow.

10) The values apply to new heat pumps with clean heat exchangers.

11) Sound power level measured according to EN ISO 3741 at A7W45 (EN 12102).

12) Sound power level measured according to EN ISO 3471.

13) Do not use propylene glycol or ethanol.

14) Heat pump with 12 kW additional heater.

15) Heat pump with 15 kW additional heater.

16) According to IEC6100.

VMGFC302